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Construction Methods and Equipment

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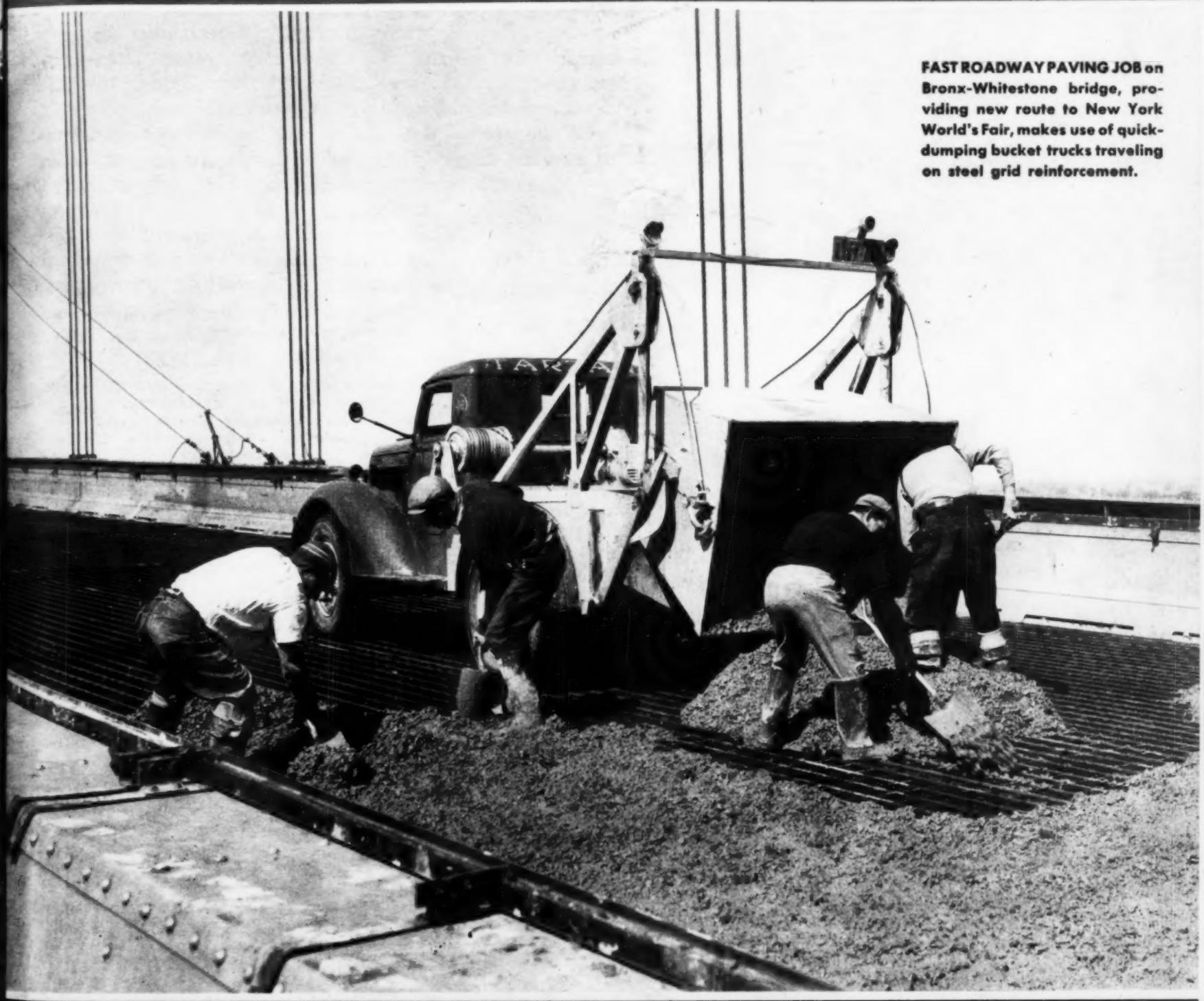

FAST ROADWAY PAVING JOB on Bronx-Whitestone bridge, providing new route to New York World's Fair, makes use of quick-dumping bucket trucks traveling on steel grid reinforcement.

In This Issue

BRONX-WHITESTONE BRIDGE — Two articles, one describing placement of concrete in anchorage with long-boom crane and the other telling how paving of roadway was rushed to completion in time for opening of New York World's Fair.

EQUIPMENT FOR COMPACTING EARTH FILL — Results of highway grading tests with rollers of different types to obtain maximum density in embankments. — By W. S. DUNN, assistant engineer, Ohio Department of Highways.

PRE-FABRICATION FOR LOW-COST HOUSES — Methods employed to reduce costs of 100 homes on Missouri resettlement project of Farm Security Administration.

SPEEDY SEWER INSTALLATION — How 700-ft. long line of corrugated metal pipe was laid across lake in three days.

SUB-BALLAST TRACK SUPPORT — Experiment by Pennsylvania Railroad uses cement-grouted slab under main-line track at Cleveland to reduce maintenance costs.

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CURRENT JOBS

. . . . and Who's Doing Them

BUILDINGS

Public—For social security buildings in Washington, D.C., the Treasury Department awarded to **McCloskey & Co.**, of Philadelphia, a $10,871,000 contract. Successful bidder for the St. Thomas housing project in New Orleans, was **Henry Ericsson Co.**, of Chicago, with a price of $3,678,000. Municipal housing project in Buffalo, N. Y., went to **J. W. Cowper Co.**, local contractor, for $2,329,350. General federal office building, Washington, D.C., was bid in by **McCloskey & Co.**, of Philadelphia, for $2,324,000. For a mass housing project in Yonkers, N. Y., contract of $2,176,000 was awarded to Psaty & Fuhrman, Inc., of New York City. In Seattle, Wash., a federal court house costing $1,214,000 will be built by **N. P. Severin Co.**, of Chicago. Miami, Fla., is to have a new court house costing $1,158,627 on which work has started by **A. Farnell Blair**, of Lake Charles, La. Low bidder for the West End housing project in Louisville, Ky., was **Struck Construction Co.**, local contractor, with a price of $1,731,000. In Buffalo, N. Y., **W. F. Hendrich Co., Inc.**, local contractor, will build a $1,690,000 municipal auditorium. Low bidder for housing project in Elizabeth, N. J., was **Millmet Construction Co.**, of New York, with a tender of $1,210,600. Costing $1,569,620, the Lamar Terrace housing project in Memphis, Tenn., will be built by **S. & W. Construction Co.**, of Memphis. In Huntington, W. Va., **Consolidated Engineering Co.**, of Baltimore, obtained the $1,777,000 Marcum Terrace housing project. In Tennessee, Chattanooga's low rent housing project for negroes, to cost $1,655,750, went to **Foster Creighton Co.**, of Nashville. Low rent housing project in Knoxville, Tenn., was bid in for $1,079,000 by **McGill & Daugherty & Whisman Co.**, of Knoxville. In Philadelphia, Pa., the James Weldon Johnson Homes will be built by **Wark & Co.**, local contractor, for $1,584,620. General contract for the Valley View Homes project, Cleveland, Ohio, was bid in by **S. W. Emerson Co.**, local contractor, for $1,549,000. In Nebraska, Omaha's Terrace Homes will be built for $1,973,000, by **Peter Kiewit Sons Co.**, of Omaha. Low bidder for 40 concrete block houses in Tampa, Fla., was **P. H. Smith Construction Co.**, of Haines City, Fla., with price of $922,450. **W. E. Wood Co.**, of Detroit, Mich., will build the Champion Avenue housing project in Columbus, Ohio, for $997,416. For housing project in Fort Worth, Tex., low bidder was **J. E. Morgan & Sons**, of El Paso, with price of $781,953. The housing authority of Columbus, Ga., has awarded a $706,706 contract to **Mion Construction Co.**, of Atlanta, Ga. A $692,000 housing project in Newark, N. J., will be built by **Fatzler Co., Inc.**, local contractor. **Algernon Blair**, of Montgomery, Ala., with price of $644,850, was successful bidder for the Little-Page Terrace housing project in Charleston, W. Va. For the 23-building housing project in Kokomo, Ind., low bid of $374,900 was received from **Superior Construction Co.**, local contractor. The Commodore Perry housing project in Buffalo, N. Y., went to **John W. Cowper Co.**, of Buffalo, N. Y., for $2,329,355.

Commercial & Industrial — A 14-story office building for the Lycurgus Realty Corp., will be built in Brooklyn, N. Y., by the **George A. Fuller Co.**, of New York City, at a cost of $3,500,000. **J. H. Taylor Construction Co.**, of New York City, was successful bidder for a 26-story apartment on Broadway and 58th St., New York City. In North White Plains, N. Y., 250 residences, costing $2,000,000 will be built by the **Independence Foundation, Inc.**, of New Castle, N. Y.

A paper mill costing $5,000,000 will be built in Mobile, Ala., by the **Rust Engineering Co.**, of Birmingham, for Hollingsworth & Whitney Co. In Stanton, Calif., **Stone & Webster**, of Los Angeles, will construct, for the Southern California Edison Co., a sub-station and 27 mi. transmission line at combined cost of $3,500,000. A warehouse in Jersey City, N. J., for the Continental Can Co., went to the **Austin Co.**, of New York, for $1,000,000. At a cost of approximately $1,000,000, **James Stewart & Co.**, of New York City, will build at Quincy, Mass., a factory for Procter & Gamble Co.

WATERWORKS AND SEWERS

Steel force main in Toledo, Ohio, costing $1,055,529 will be built by **W. W. Magee** of St. Paul, Minn. In Grand Rapids, Mich., **Price Bros Co.**, of Dayton, Ohio, have a $750,911 pipe laying contract. Dam at Bethlehem, Pa., costing $683,154 is under construction by **C. W. Good**, of Reading, Pa. With price of $466,180, **J. J. McHale & Sons, Inc.**, of Pawtucket, R. I., were successful bidders for a water filtration plant in that city. In Spartanburg, S. C., **Fiske-Carter Construction Co.**, local contractor, will build a $181,500 addition to the water purification plant.

Sewage disposal works in Springfield, Mass., to cost $1,078,208, will be built by **Caye Construction Co.**, of New York City. For a sewage treatment plant in Gary, Ind., low bid of $958,900 was received from the **Permanent Construction Co.**, of Chicago. Fort Wayne, Ind., has given a $866,538 contract to **Gargara Co., Inc.**, of Detroit, Mich., for an interceptor sewer. **J. Lombardi**, of Philadelphia, will build a $544,223 diversion sewer in Washington, D.C. In Marion, Ind., a sewage treatment plant will be built for $547,366 by **E. Steigerwald & Sons, Inc.**, and **R. C. Borchert**, of Milwaukee, Wis.

HIGHWAYS

The Pennsylvania Turnpike Commission has awarded a number of contracts for its 160-mi. super highway between Harrisburg and Pittsburgh as follows: $2,672,188 to **Guthrie-Marsch-Peterson Co.**, of Chicago, for Allegheny tunnel; 1,920,281 to **Hunkin-Conkey Construction Co.**, of Cleveland, Ohio, for Laurel Hill tunnel; $2,445,851 to **Arundel Corp.**, of Baltimore, for Sideling Hill tunnel; $326,209 and $315,406 to **York Engineering & Construction Co.**, of York, Pa., for a viaduct and a grading and drainage project; $240,532 to **Connell & Laub Construction Co.**, of Dayton, Ohio, for grading and overpasses; $429,781 to **L. M. Hutchison**, of Mt. Union, Pa., for 9 bridges and 3 underpases; $582,711 to **Frank Mashuda**, of Milwaukee, Wis., for grading, drainage and overpasses; $1,549,718 to **Mason & Hanger, Inc.**, of New York City, for Rays Hill tunnel.

Construction Methods and Equipment

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JUNE, 1939

ROBERT K. TOMLIN, Editor
A. E. PAXTON, Manager

Editorial Staff: Vincent B. Smith, Paul Wooton (Washington), Nelle Fitzgerald

A McGRAW-HILL PUBLICATION

The "How" of it

For the benefit of readers concerned with the practical application of method or equipment the following references are to articles or illustrations in this issue that tell:

How LONG-BOOM CRANE placed concrete in anchorage for cable suspension bridge. — p. 42
How TRANSFER HOPPER at end of belt conveyor from mixers fed concrete into 3-yd. buckets. — p. 42
How TIME STUDIES produced tabulated data on operating cycle of crane. — p. 43
How QUICK-DUMPING BUCKETS on rear ends of light trucks delivered concrete for bridge roadway. — p. 44
How ELECTRIC VIBRATOR with longitudinal runners consolidated concrete for bridge deck reinforced with steel grids. — p. 46
How PREFABRICATION of standard panels lowered cost of farm buildings. — p. 48
How BULK CEMENT for concrete paving was loaded into batch trucks at dock equipped with balanced dumps mounted on rockers. — p. 49
How FILL-COMPACTING EQUIPMENT of three types, including sheepsfoot, standard cylinder and pneumatic-tired rollers, was tested by highway department. — p. 50
How EMBANKMENT SETTLEMENT was measured by special cell. — p. 52
How CONTRACTOR'S EQUIPMENT "KINKS" saved time on road widening job. — p. 54
How CONCRETE CANAL LINING was placed with mechanized equipment. — p. 58
How LIME ROCK PLOW replaced explosives in preparing road subgrade. — p. 58
How LUBRICATION of contractor's equipment was done with mobile service station mounted on truck. — p. 58
How INSULATION of steam main was effected with paper-filled tile ducts. — p. 58
How TOWER TRAVELER erected steel for bridge tower. — p. 59
How SPECIAL FORMS and scaffolding helped build tapered circular concrete stack. — p. 59
How RAILWAY TRACK was supported by cement-grouted sub-ballast slab. — p. 60
How PLANT FOR MIXING GROUT was mounted on railway flat cars. — p. 61
How GAPS IN DAM were closed, for concreting, with huge steel gates. — p. 63
How BELT CONVEYOR for handling concrete aggregates was spliced in field. — p. 64
How GLASS BLOCK was employed in walls and tower of World's Fair building. — p. 66

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This is due in no small measure to the consistent performance of 'Incor', which has earned the confidence of building departments as well as engineers and contractors, on the basis of its high-early and high-ultimate strengths.

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Model 60 . . . 28,400 lbs.
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ONE 5/8 YD. MODEL

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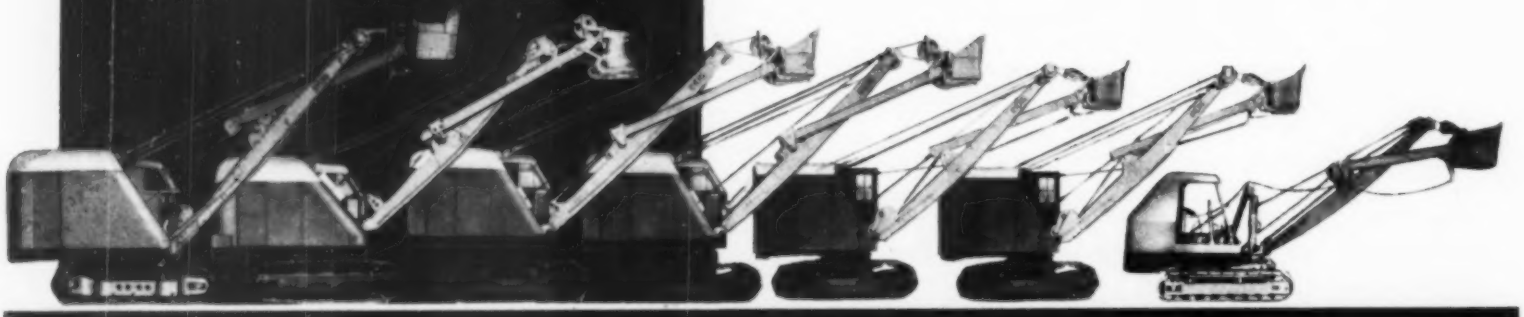

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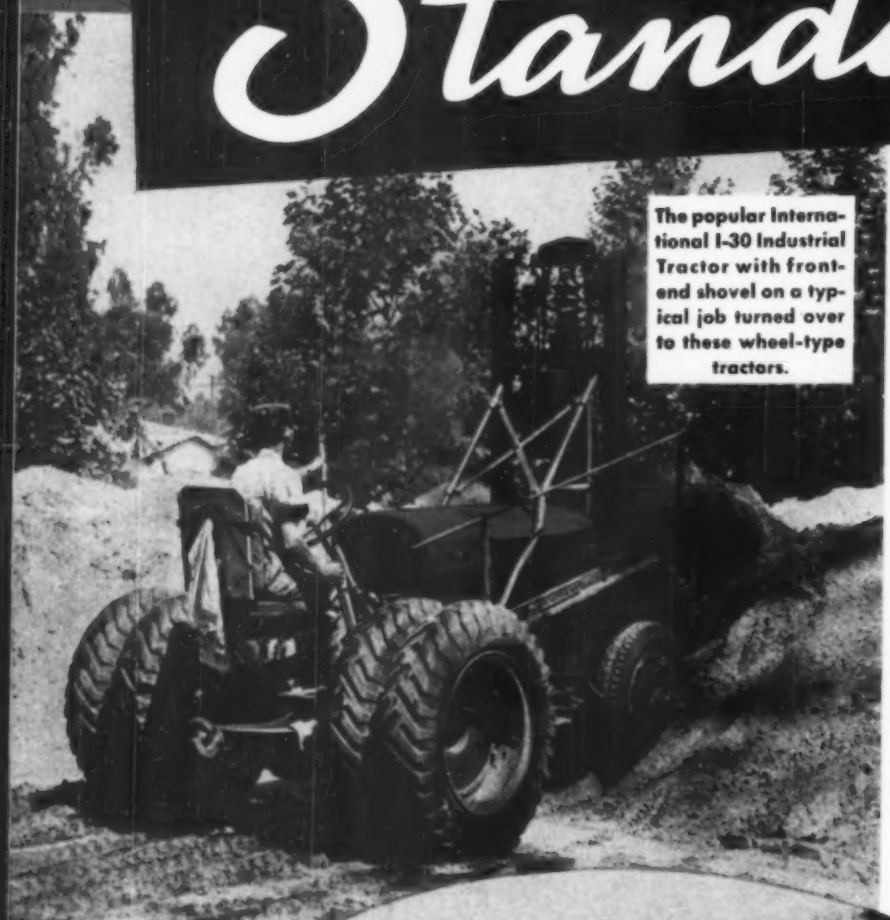

The popular International I-30 Industrial Tractor with front-end shovel on a typical job turned over to these wheel-type tractors.

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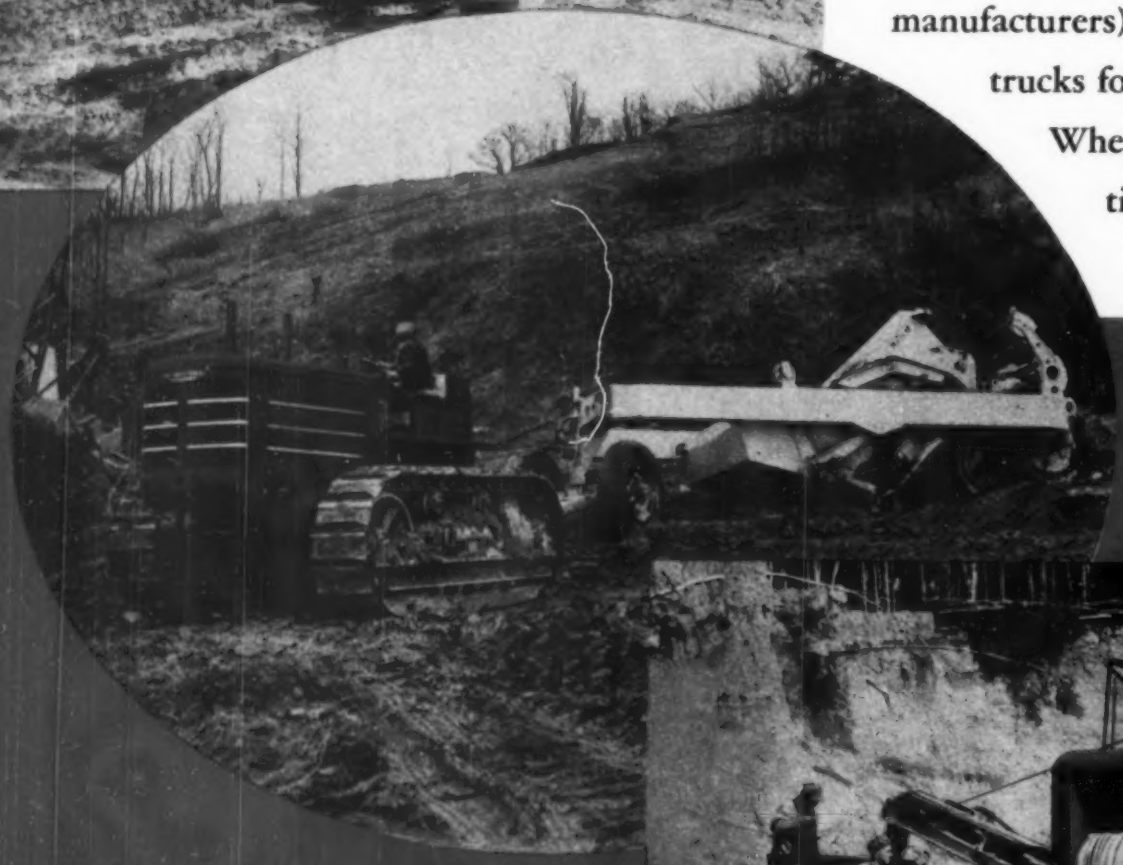

Above: Moving dirt fast, at low cost, with the new International TD-18 TracTracTor powering an 8½-cubic-yard (heaped capacity) scraper. This powerful 70 h.p. full Diesel tractor is the easiest steering crawler built. It has 6 forward and 2 reverse speeds—and many other features you have wanted in a big crawler tractor.

Below: An International PA-100 Power Unit operates this crusher—turning out 400 yards of gravel every eight hours. An International Truck is hauling away from the crusher.

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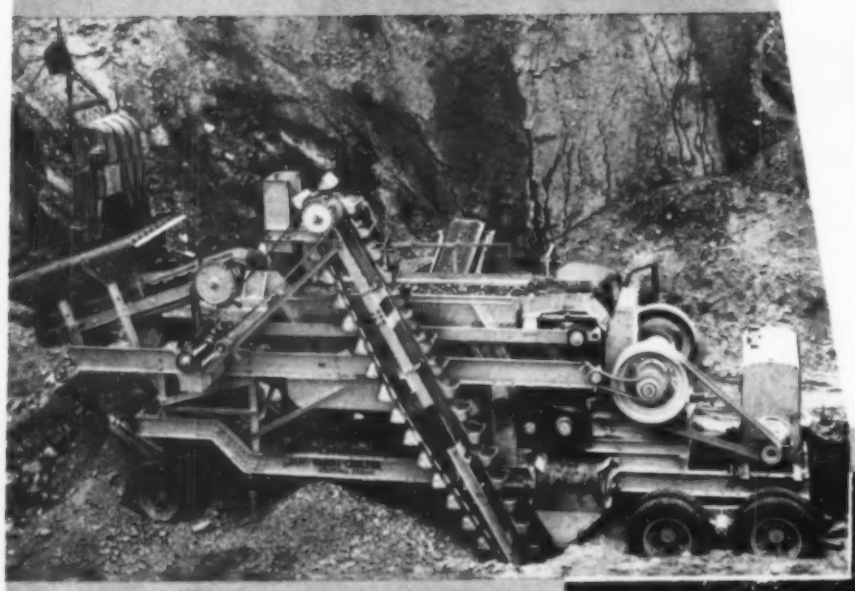

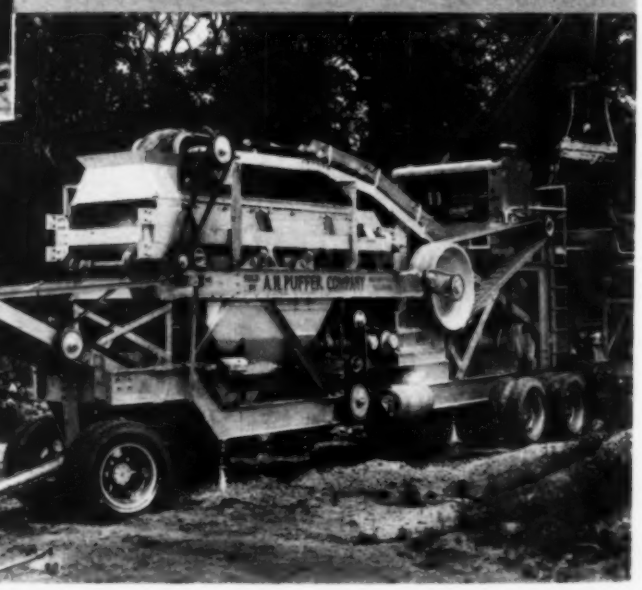

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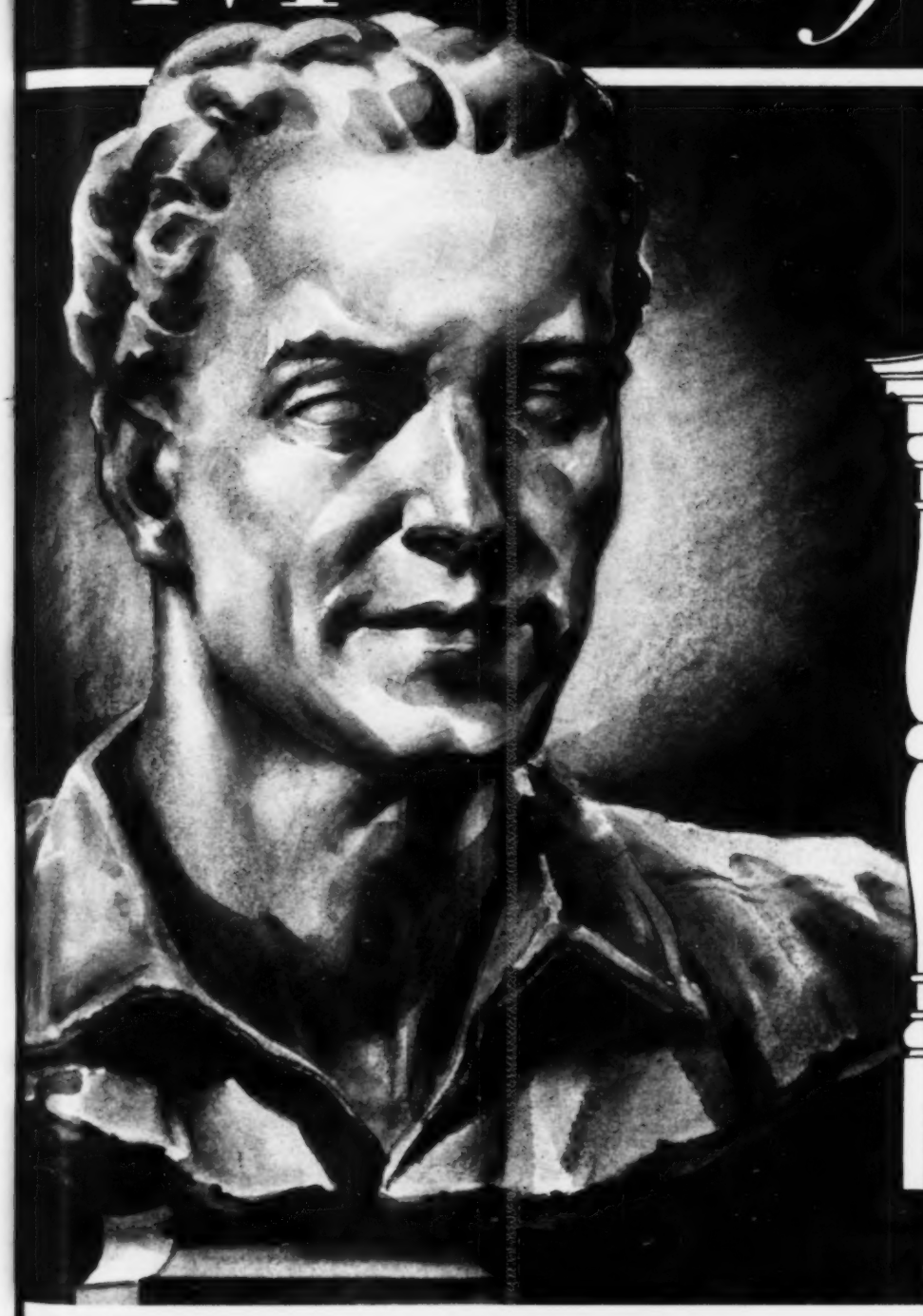

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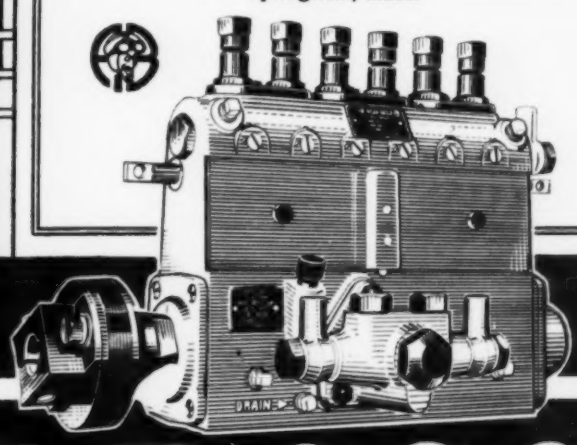

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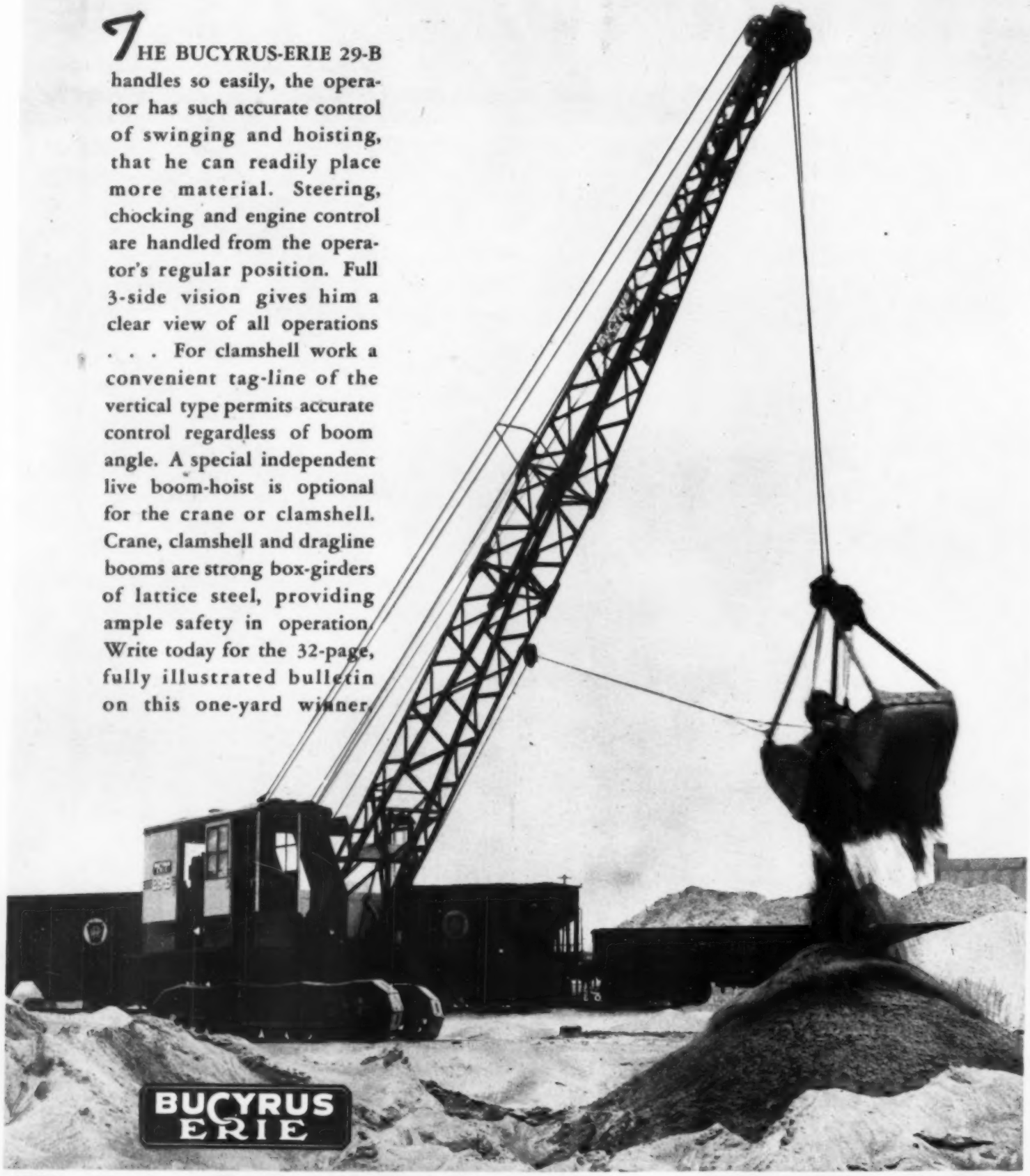

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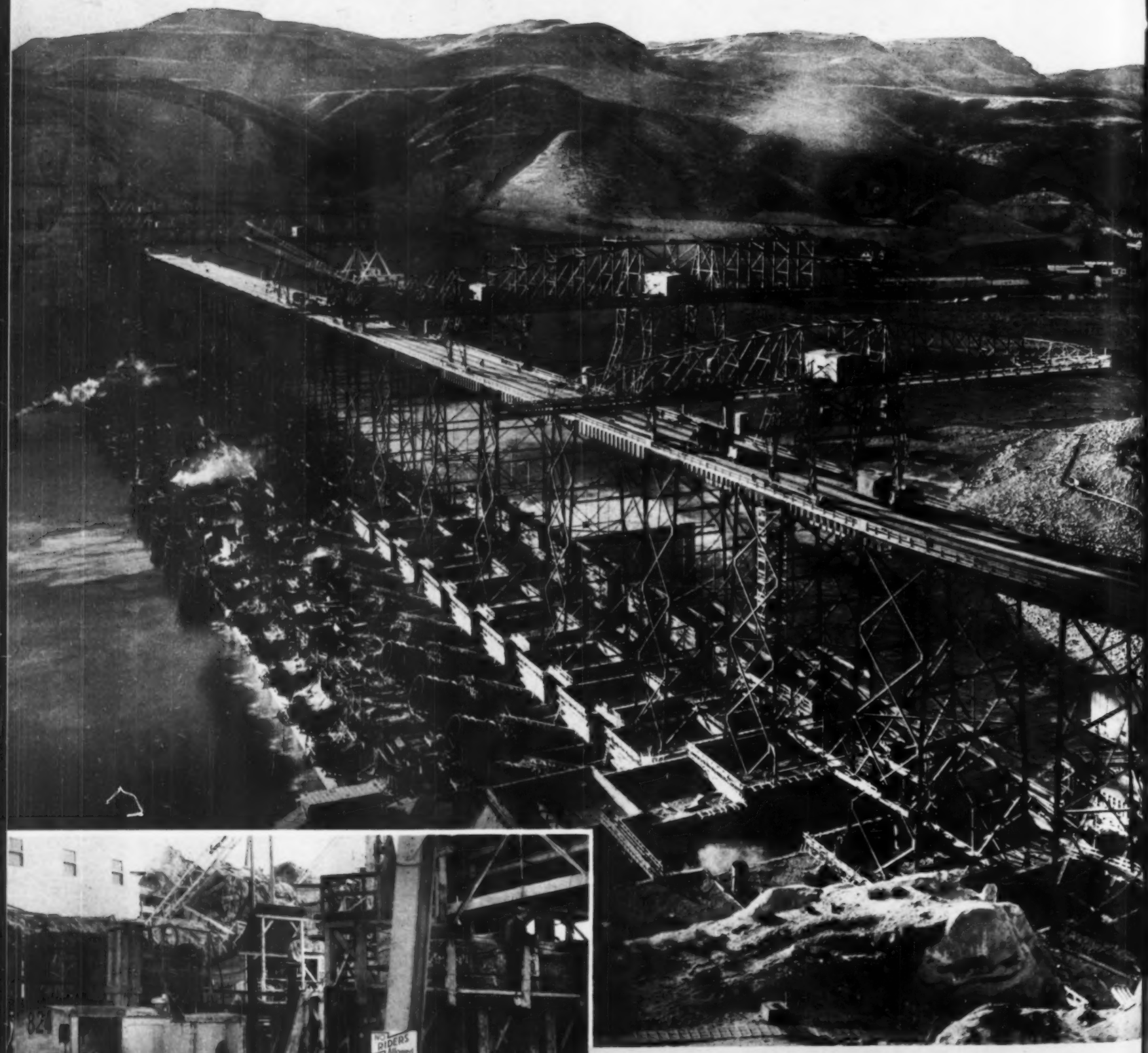
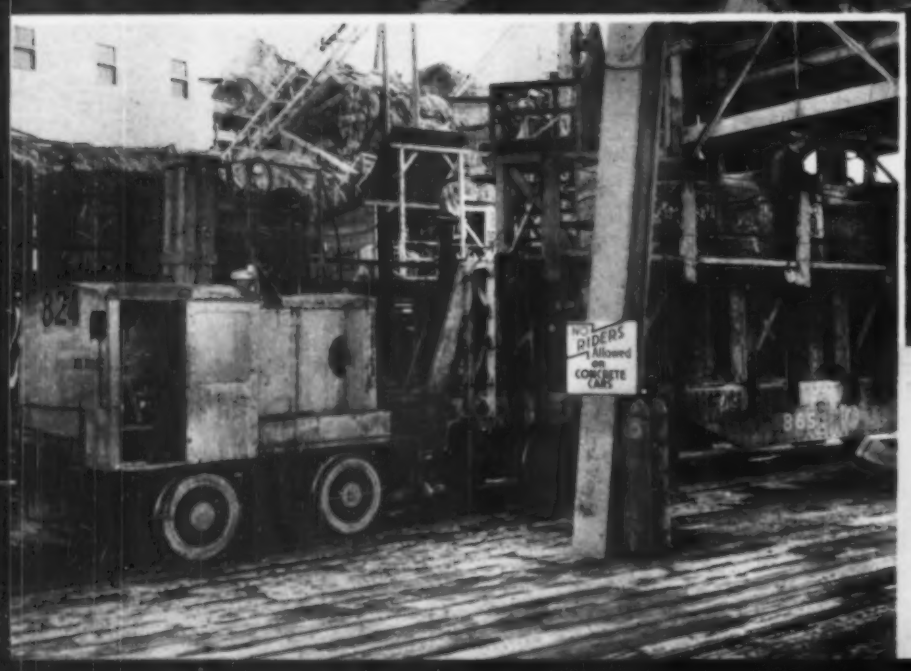
General Offices: 500 Fifth Avenue, New York City; Sales Offices and Warehouses: Worcester, New York, Chicago, Buffalo, San Francisco, Los Angeles, Tulsa, Chattanooga, Houston, Abilene, Texas, Seattle. Export Sales Department: New York City.

Profits come





Grand Coulee Dam . . . where twenty-one "Caterpillar" Diesel Engines, eleven "Caterpillar" Diesel Tractors, and one "Caterpillar" Diesel Auto Patrol are making profits come easier for their owners!

One of the "Caterpillar" Diesel-powered units at Grand Coulee. This locomotive, hauling concrete, uses a "Caterpillar" Diesel D13000 Engine.

EASIER . . .

with "Caterpillar" Diesel Engines

YOU'RE not going to spend much money for fuel, when you put a "Caterpillar" Diesel Engine to work! And that holds true, regardless of what it powers—shovel, dragline, locomotive, compressor, pump, crusher, or *any* other equipment!

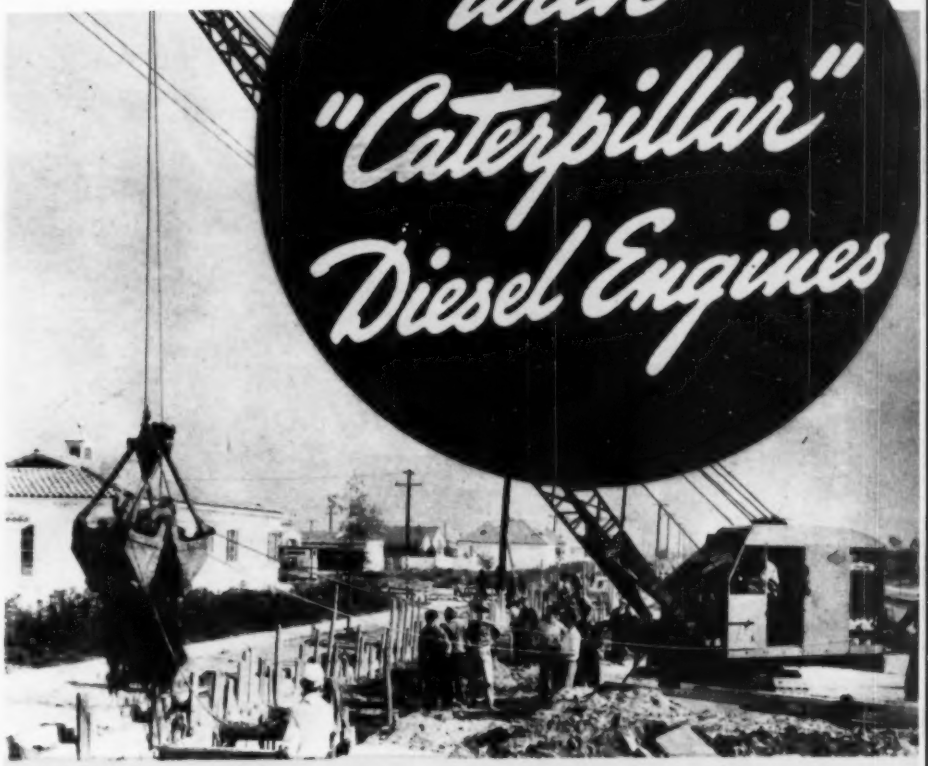
Fuel-economy, however, is only the *first* of a "Caterpillar" Diesel's advantages that make profits come easier. You'll see this almost immediately, because it's an hour-to-hour saving. But you also have day-to-day and year-to-year advantages:

There's *dependability* to keep the job rolling steadily, 24 hours a day if necessary, without frequent or costly lay-ups for maintenance-repairs. And there's *stamina* and *durability* that gives these engines long life.

Over 100 leading manufacturers of contracting equipment recognize these qualities and power their products with "Caterpillar" Diesels. That is a recommendation—as well as *another* advantage! For it means you can standardize on your equipment, and save time by looking to only one source for your service and parts-replacements.

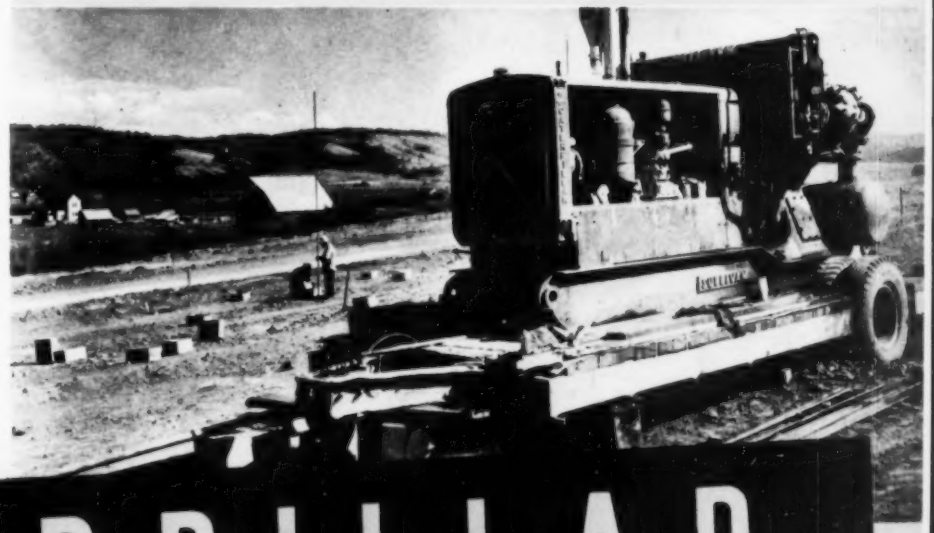
Talk over your power-requirements with your "Caterpillar" dealer. Or write direct. There are nine sizes of "Caterpillar" Diesel Engines—32 to 160 horsepower.

CATERPILLAR TRACTOR CO., PEORIA, ILL.



Speeder shovel equipped with a ⅜-yard bucket and powered by a "Caterpillar" Diesel D6600 Engine building a mile of storm-drain in Los Angeles. During an 8-hour day, this outfit handles 250 yards . . . and uses only 3½ cents' worth of fuel an hour! Another example of the matchless economy of "Caterpillar" Diesel Power.

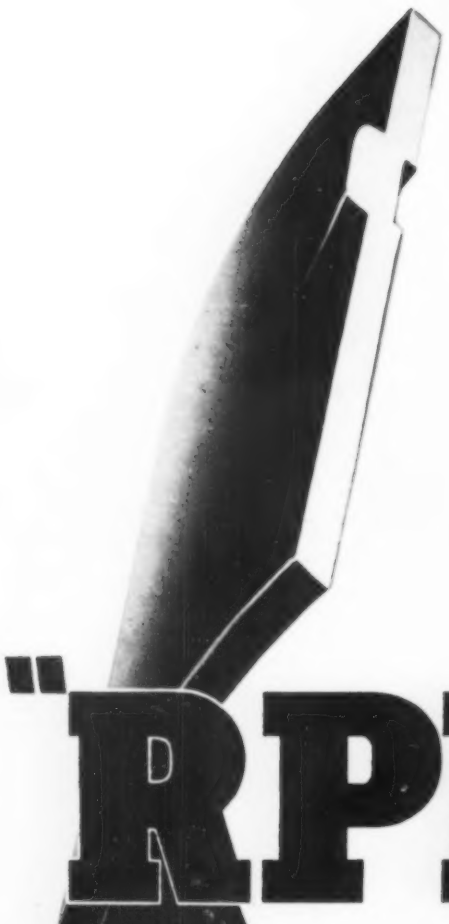
Highway construction near New Meadows, Idaho. Working at a 4000-foot elevation, a "Caterpillar" Diesel D13000 Engine powers a Sullivan compressor which supplies air to 4 jack-hammers and a drill-bit sharpener. Drill-steel as long as 20 feet. Working in basalt rock. Operates 8 hours a day, on 6 gallons of 9-cent fuel an hour.



CATERPILLAR

DIESEL POWER

TRACK-TYPE TRACTORS • ROAD MACHINERY



Another great

New

"RPM" DELO

[Diesel Engine Lubricating Oil]

SOLVES LUBRICATION PROBLEMS OF EVERY DIESEL ENGINE

10 MILLION Test miles—90 thousand Test hours prove the NEW "RPM" DELO UNEQUALED by any Diesel Engine Lubricating Oil now on the market.

STANDARD OIL COMPANY

Diesel-lubricating Victory

No Matter What Engines You Use YOUR DIESELS STAY CLEAN AND WEAR-RATE HITS A NEW LOW

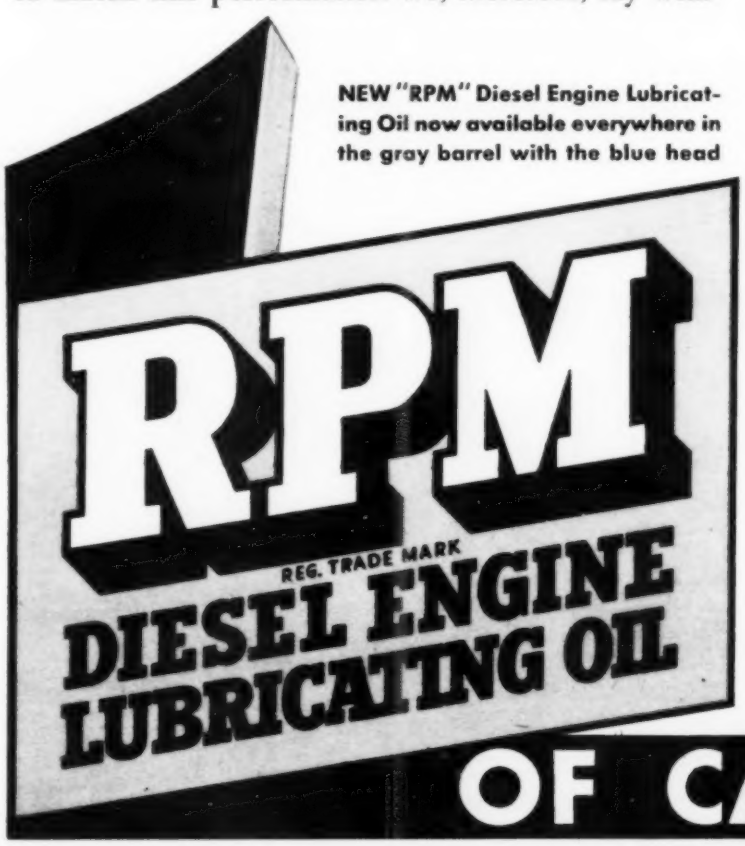
NEW "RPM" DELO solves your Diesel engine lubrication problems. In EVERY Diesel, in any kind of service, on land or sea, it combines clean-engine performance with full protection for every type of bearing—Babbitt or alloy.

Actual engine tests, conducted for thousands of hours—millions of miles—show that NEW "RPM" DELO keeps all types of alloy bearings in perfect condition. And it keeps rings free—pistons clean—filters unclogged—oil passages open under all kinds of heat and load conditions.

No other oil in our experience—or yours—is able to match this performance. We, therefore, say without hesitation that NEW "RPM" DELO (in proper S. A. E. grades) is UNEQUALED by any oil, in Diesel engine lubrication.

Ask our Representative or your nearest Distributor to see the Engineers' Report on NEW "RPM" DELO, complete with charts and unretouched photographs of our conclusive engine tests! Your own experience will prove every statement in it.

The sooner you begin using NEW "RPM" DELO, the sooner you will solve your Diesel engine lubricating problems—and cut maintenance costs to the minimum. Better start now!



NEW "RPM" Diesel Engine Lubricating Oil now available everywhere in the gray barrel with the blue head

ORDER FROM YOUR NEAREST DISTRIBUTOR AS LISTED BELOW:

IN THE UNITED STATES

"RPM" Diesel Engine Lubricating Oil:

The California Company (Montana only)
Humble Oil & Refining Company
Standard Oil Company (Indiana)
Standard Oil Company (Nebraska)
Standard Oil Company of California
Standard Oil Company of Texas
Utah Oil Refining Company

Diol "RPM" Diesel Engine Lubricating Oil:

The Carter Oil Company Tulsa, Oklahoma
Colonial Beacon Oil Company
Standard Oil Company of Louisiana
Standard Oil Company of New Jersey
Standard Oil Company of Pennsylvania

Kyso "RPM" Diesel Engine Lubricating Oil:

Standard Oil Company (Inc. in Kentucky)

Signal "RPM" Diesel Engine Lubricating Oil:

Signal Oil Company

Sohio "RPM" Diesel Engine Lubricating Oil:

The Standard Oil Company (Ohio)

IN CANADA

"RPM" Diesel Engine Lubricating Oil:

Imperial Oil Company Limited
Standard Oil Company of British Columbia Limited

THROUGHOUT THE WORLD

"RPM" Diesel Engine Lubricating Oil is also available through distributors in more than 100 other countries.
Get in touch with your nearest distributor — for a clean engine, and long hard service with the minimum of overhaul.

OF CALIFORNIA

LAPLANT-CHOATE MEANS Lower Costs

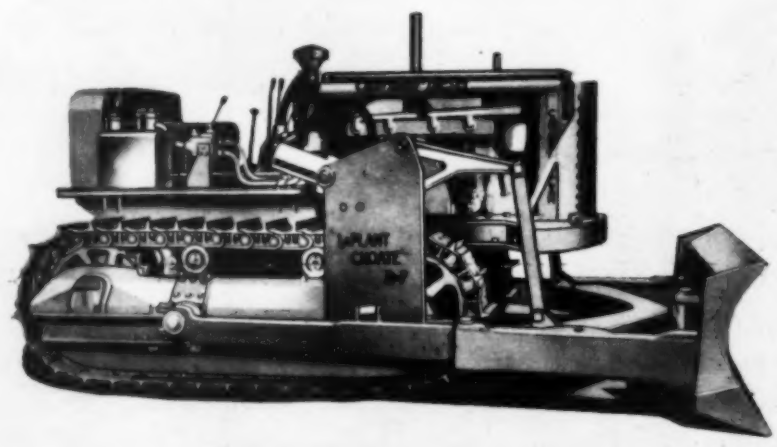
For Extra Dividends on Every Job... Modernize with LAPLANT-CHOATE Trailbuilders

Now Available with Hydraulic or Cable Operated Control

To help you derive maximum efficiency and profits from your earth-moving equipment on every job, LaPlant-Choate now offers its world-famous Trailbuilder with two types of blade control... Hydraulic and "Caterpillar" Cable Control Units. This means that you can enjoy LaPlant-Choate quality, dependability, economy and efficiency in a type of Trailbuilder that best suits your needs and your preference.

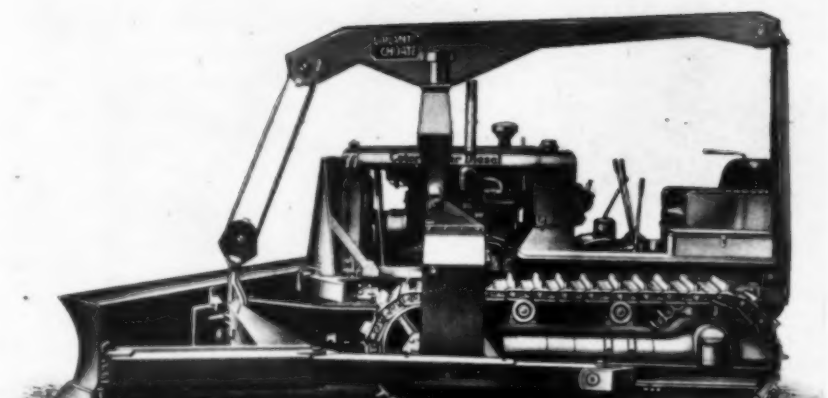
Both these rugged, powerful units are scientifically designed to move more yards at a lower cost per yard. They are versatile, safe and easy to operate and built exclusively for use on your "Caterpillar" track-type tractor. Invesigate LaPlant-Choate Trailbuilders today.

Hydraulic Control



Here is a unit that is used daily on thousands of jobs for digging, pushing, clearing land, leveling, spreading and other construction operations. Finger-tip Hydraulic Control assures positive down pressure for digging and rigid locking of the blade in any desired position. Upkeep costs are kept at an absolute minimum. Because the blade and tractor are properly balanced and mounted, the unit is singularly free from troublesome and costly breakdowns. The dependable Hydraulic pumps carry a full year's guarantee. You stop worrying about those tough jobs when a LaPlant-Choate Trailbuilder goes to work increasing production and cutting costs.

Operated by "Caterpillar" Cable Control Units



The cost on this new cable-operated track mounted LaPlant-Choate Trailbuilder is slightly less than an hydraulically controlled unit. Our years of engineering experience have been utilized to the fullest to assure you of maximum efficiency and famous LaPlant-Choate quality in this new addition to our line. "Caterpillar" Cable Control Units give you a powerful, dependable machine that operates profitably on any job that permits use of a cable operated Trailbuilder. You can proudly compare its performance with that of any unit available. Get full details today from your nearest "Caterpillar" and LaPlant-Choate dealer. Let him show you how LaPlant-Choate gives you extra value for every dollar invested.

Write today for Free circulars giving full details on the complete line of LaPlant-Choate earth-moving and land-clearing equipment. Join the thousands who have found that LaPlant-Choate equipment pays a higher return on money invested.

SNOW PLOWS
TAMPING ROLLERS
TREEDOZERS

LA PLANT-CHOATE MANUFACTURING CO. Inc.

CEDAR RAPIDS, IOWA.

BULLDOZERS
BRUSH CUTTERS
RUBBER WHEEL WAGONS
CARRIMOR SCRAPERS

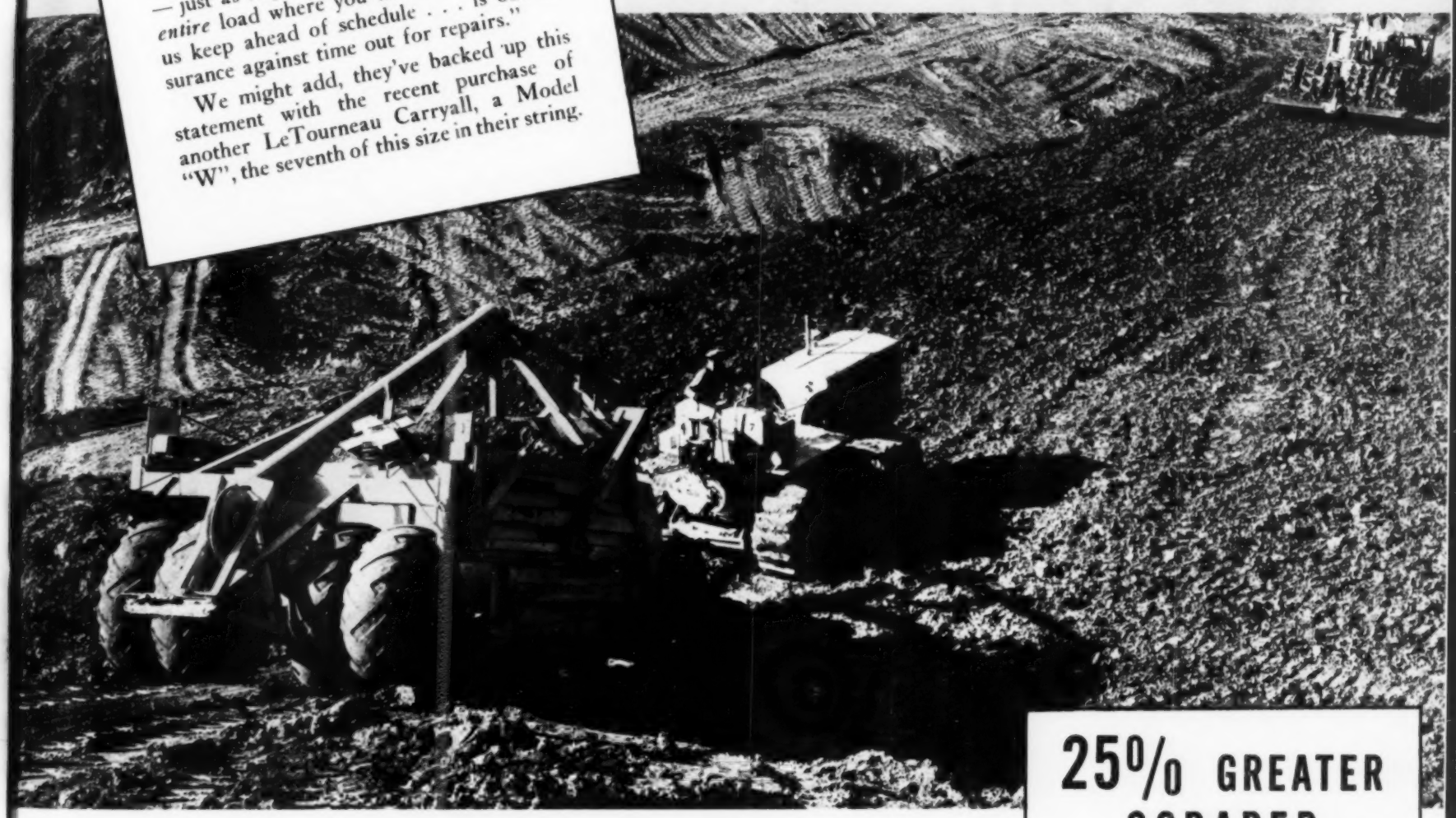
CAN YOU SAY *This* about your equipment?

"IT'S OUR INSURANCE AGAINST REPAIRS," Says L. A. CROW

"In nine years' earth-moving contracting, I have used most all makes of scrapers and other equipment built for this work and have found LeTourneau equipment the most reliable *and profitable*.

"A LeTourneau Carryall, for instance, averages far above its rated capacity, but — just as important — it always places the *entire* load where you want it. This helps us keep ahead of schedule . . . is our insurance against time out for repairs."

We might add, they've backed up this statement with the recent purchase of another LeTourneau Carryall, a Model "W", the seventh of this size in their string.



"Let's get the jump on 'favorable weather' and clean up with our Carryall Scrapers," said Contractors W. E. Hall, L. A. and R. S. Crow . . . even though handicapped by 3 feet of heavy 'dobe, saturated by winter rains.

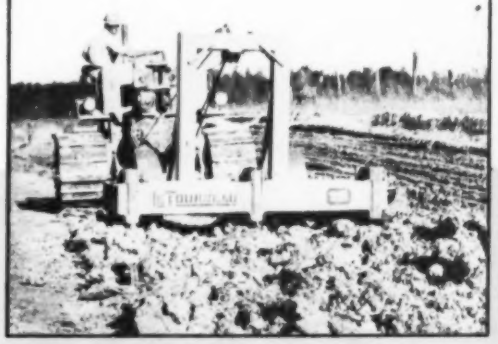
Today, they're well on their way towards finishing their earth-moving contract on the 1,640,000-yard Palo Verdes Reservoir excavation, near San Pedro, California, *sixty days ahead of schedule!* Six Carryalls already have 570,000 yards excavation and *placement* to their credit in a three-months' period.

Working alongside 6-year-old veteran 12-yards . . . and making trip for trip without compromise on weather or working conditions . . . are several new Carryalls, Model "W's", giving *6 and more yards* greater performance for the same D8 tractor horsepower. Two major improvements in Carryall operating ease, developed since most contractors last bought, make this production possible: direct cable pull at the *center* of the tailgate to accommodate effortless positive ejection of the larger loads . . . plus the *correct degree* of larger diameter broad-tread, pneumatic tire "flotation" for easier loading and travelling.

If your scraper isn't built by LeTourneau it isn't a *Carryall* . . . if it isn't a Carryall, you're *compromising* with profits under *all* working conditions! Your "Caterpillar" and LeTourneau dealer will prove it against all comers. R. G. LeTOURNEAU, INC., Peoria, Illinois; Stockton, California. Cable address: "Bobletorno".

25% GREATER SCRAPER EFFICIENCY

Shattering blasting costs in shale rock isn't the only benefit from LeTourneau Rooter operation. Two heavy duty units like this cut Carryall loading time in the ordinary hard digging at Palo Verdes fully 25%. Four LeTourneau Bulldozers handle materials over the shorter hauls to further save Carryall time.



LETOURNEAU

CARRYALL® SCRAPERS, ANGLEDOZERS®, BULLDOZERS, ROOTERS®, POWER CONTROL UNITS, DRAG SCRAPERS, PUSHDOZERS, SHEEP'S FOOT ROLLERS, CRANES, TREEDOZERS.

®Name Reg. U. S. Pat. Off.

Lick delay at these 3 points

AND YOU'LL GET

MORE SPEED . .

MORE PROFIT . .

☆ *at the shovel . .*

Minutes lost at the shovel can pile up into hours and days lost on the job. Athey Forged-Trak Trailers, pulled by "Caterpillar" Diesel tractors, lose NO time in maneuvering—can turn at a right angle—require NO "time out" for cleaning up loader spill. *Load without delay and you step up profits.*

☆ *on the road . .*

Rubber-tired vehicles get mired—slip on greasy clay—cut tires on sharp rocks, too. There's NO miring with Athey Forged-Trak Trailers—you don't have to wait for just the right ground conditions—and there's NO hazard from sharp rocks. *Consistent roading speed steps up your profits.*

☆ *at the dump*

Are you wasting time with hauling units that get stuck on the dump—that can't crowd right up to the edge of fill? You'll have NO such delays with Athey Forged-Trak Trailers—they climb right over the dump—up to the edge of the fill—dump quickly and cleanly. *Speed up the job and you speed up profits.*

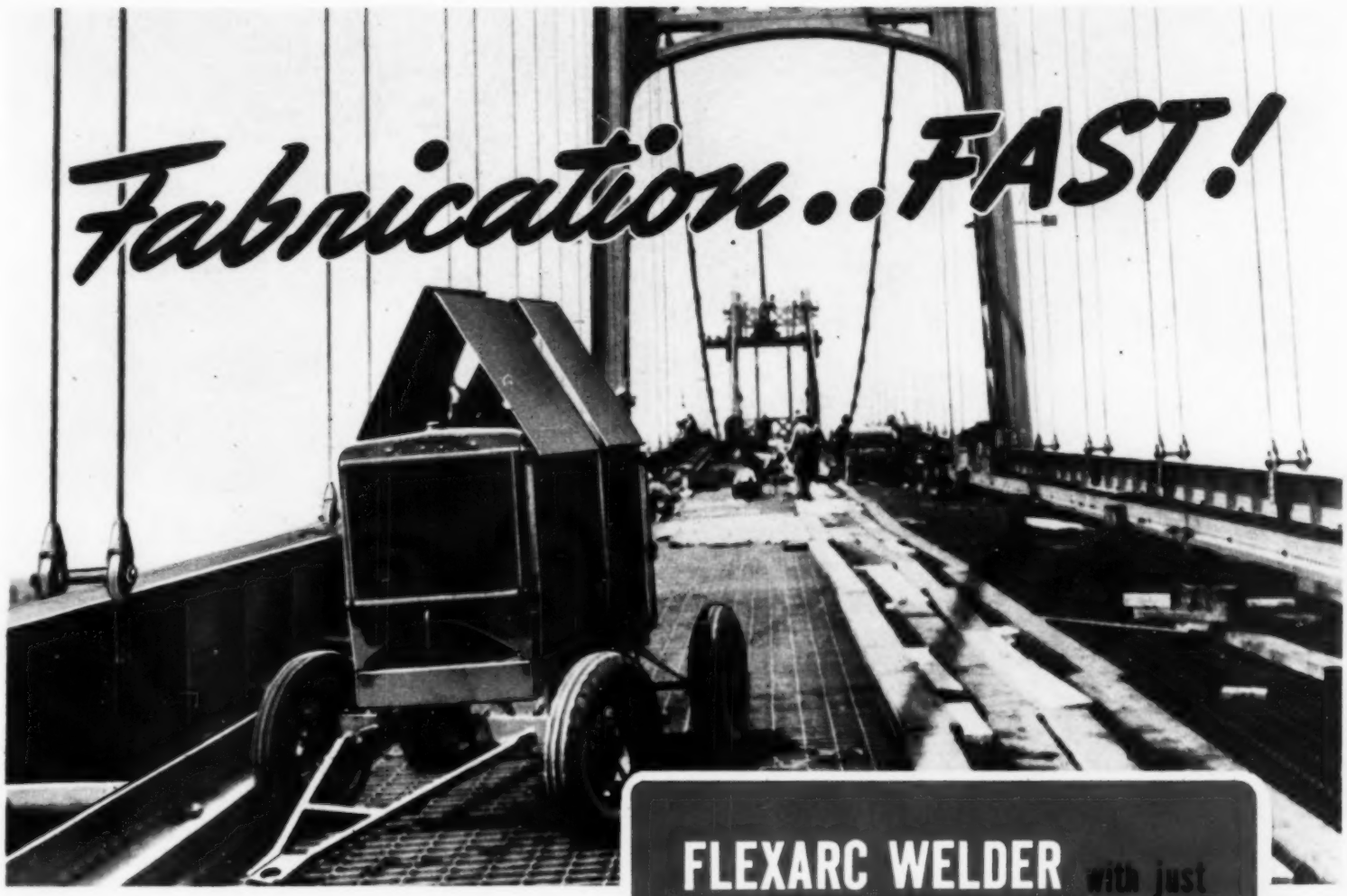
See your "Caterpillar" dealer or write

ATHEY TRUSS WHEEL CO.
5631 WEST 65th STREET, CHICAGO, ILL.
Cable Address: "Trusswheel," Chicago

ATHEY

SEE YOUR "CATERPILLAR" DEALER

FORGED-TRAK TRAILERS



Canadian suspension span of new seven-mile long Thousand Island International Bridge project recently completed. The I-beam lock floor system was welded with the Westinghouse FlexArc gas-engine driven welder shown. The open grid steel floor was then encased in concrete to form a 4-inch armored deck.

JUST SET — AND WELD!
No complicated controls — FlexArc's ONE PRESET CONTROL gives a completely *constant* arc that means stronger, faster welds. Mail coupon.

FLEXARC WELDER with just ONE PRE-SET CONTROL

points way to construction savings

Faster work . . . less dead weight . . . savings in material costs . . . are big advantages welding offers on jobs like this.

To these, Westinghouse adds another — new "streamlined control" that means even faster work, better welds and added savings in labor costs. "Nuisance gadgets" — meters, rheostats, reactors, control boxes — are eliminated with the FlexArc welding generator. Driven by a husky, powerful Chrysler engine, FlexArc has just ONE control. Pre-set for the current needed, FlexArc delivers it — for one hour or for ten — without drop-off after the machine warms up, without trips back and forth to "cut and try," without re-adjustments for changes in welding position.

Westinghouse FlexArc opens up new savings on maintenance and construction welding. If you do not have full facts on FlexArc be sure to get them — you'll find them profitable! Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

J-20842

Westinghouse Flexarc Welders

☐ More details, please, on FlexArc welders.

☐ We're interested in the FlexArc RENTAL PLAN. Please tell us where they are available.

Name_____

Company_____

Address_____

City_____

YOU CAN'T
Run This Dragline OFF Its Crawler Belts

● You'll never "throw" these crawlers with sharp turns, because there's no tendency to force rollers off the shaft. Side pressures are taken between crawler frames and shoes, so the ground takes the skid—not the crawler track. P&H crawlers work on the roller chain principle with double sprocket drive. There's no slapping or jerky action to cause damage in travel. By putting an end to common crawler troubles, these new P&H machines have solved a major item of lost time and expense.

P&H EXCAVATORS
18 Different Sizes
From ⅜ to 5 cubic yards Capacity; Gasoline, Diesel or Electric Power.

Write for literature on the size and type that interest you. Harnischfeger Corporation, 4494 West National Avenue, Milwaukee, Wisconsin.

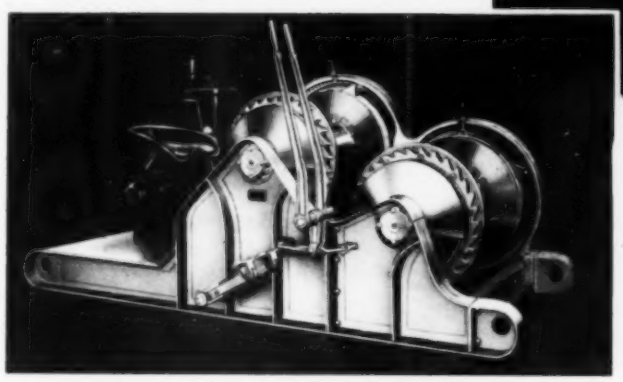
HARNISCHFEGER
CORPORATION

EXCAVATORS • ELECTRIC CRANES • ARC WELDERS P&H HOISTS • WELDING ELECTRODES • MOTORS

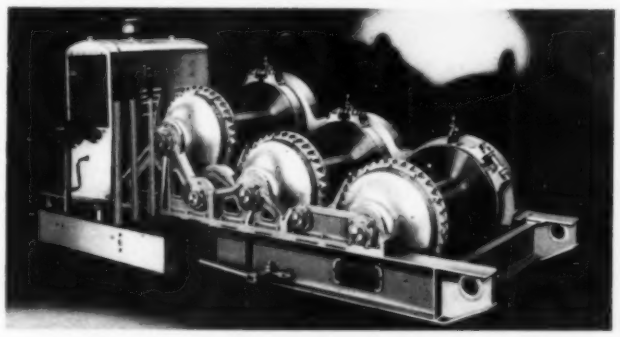
The Hoist of Today is Built by JAEGER

IN 2 SHORT YEARS JAEGER IMPROVEMENTS HAVE REVOLUTIONIZED STANDARDS OF HOIST DESIGN, PERFORMANCE AND PRICE!

"DIXIE SPECIAL"
Most Sensational Low Priced, High Quality 17-36 H.P. Hoist on Market



36-50 H.P. "UTILITY" HOISTS—Note Modern Construction



55-100 H.P. "HEAVY DUTY" HOISTS—Most Advanced on Market

6 to 100 H.P. for Every HOIST Requirement

If you have not bought a new hoist for several years, you'll find that the hoist designs and hoist ideas of yesterday are obsolete. The leading hoist on jobs today is Jaeger—with revolutionary features that contractors now demand, because they cut costs, speed operations, add up to 50% to the strength, safety and long life of any hoist.

Giant expanding frictions or clutches (same as on $15,000 shovels and cranes) replace the old back-breaking cone clutches—give easy, sure "touch control" of loads.

Self-aligning anti-friction bearings, balanced drums replace the old babbit or bronze bushings as standard on larger hoists—save power, save wear, add life.

Combined all-steel side frames and base—50% stronger, hundreds of pounds lighter, used on all sizes up to 50 H.P. Easy to add drum sections to any Jaeger Hoist.

Smooth, multi-cylinder power, silent chain drive—Jaeger features reliable, full-size engines, easy changeover to different horsepower or electric drive.

New low prices—By standardizing on 5 basic units Jaeger eliminates hundreds of parts, achieves simplified mass production, higher quality at lower prices. Mail slip below for full details.

THE JAEGER MACHINE COMPANY
800 Dublin Avenue, Columbus, Ohio

Gentlemen: Send latest Catalog H-39 and prices on Hoists, Towers (30 to 500 Ft.) and Placing Equipment.

We are also interested in ☐ MIXERS ☐ PUMPS

Name_____

Address_____

A Valuable Construction Tool

In This Case ATLAS Saved 75% in Ditching Costs

2 Test Shot on a 30-foot section of ditch. 100 pounds of Atlas Ditching Explosives used.

1 Alamo River Cut-off "D," south of Alamorio Bridge. Preparing course of ditch to be blasted.

3 Cut-off completed. A good job at a real saving!

That explosives are a valuable construction tool is no news. But a saving of 75% in construction costs, through the use of explosives, is good news!

The Imperial Irrigation District in California made this saving recently when their work required relocation of 800 feet of river channel. A floating dredge could not be used because of intervening bridges. The cost of dragline excavation was estimated at $2.00 a yard because of the necessity of "building a road" for the dragline.

Atlas Ditching Explosives, however, did the job for less than 50 cents a yard!

Such savings are possible with Atlas Explosives and Atlas methods. Ask your Atlas representative for further details.

ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Boston, Mass.	Joplin, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Butte, Mont.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
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Denver, Colo.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.	

ATLAS

EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

Speed-o-Matic

SHOVEL - DRAGLINE - CRANE

★ "In all my 14 years of experience with various makes of shovels I have never handled a machine that could turn out the work of the Speed-o-Matic with such ease and speed. Its increased yardage is remarkable. The small lever controls make it as simple to operate as driving a pleasure car."

★ The name of the operator whose photo and statement appear above will be furnished on request.

Performance records prove that Speed-o-Matic hydraulic-pressure control shovel-crane-dragline enables the operator to get 25% or more yardage than from an ordinary lever-controlled machine of equal size, and with less effort. Investigate the profit possibilities of Speed-o-Matic on your jobs.

LINK-BELT COMPANY

300 West Pershing Road, Chicago

Distributors and Offices in Principal Cities

Cedar Rapids, Iowa, Speeder Machinery Corporation

7767A

LINK-BELT

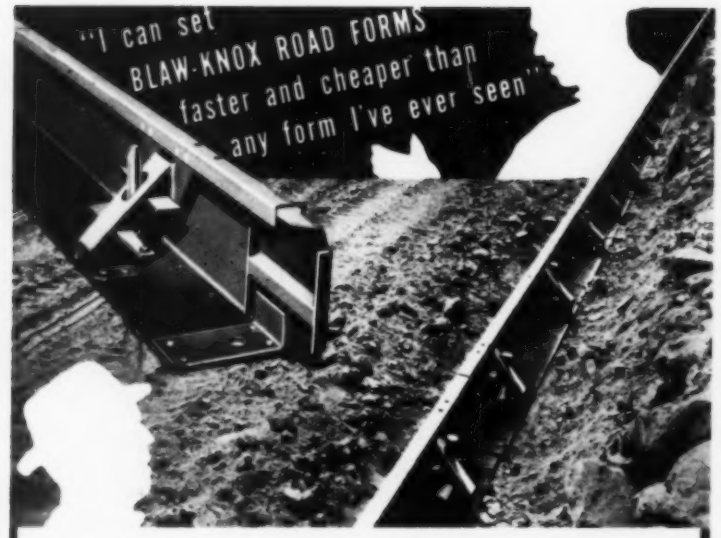
For compacting earth fills—the practical design of Blaw-Knox Sheepsfoot TAMPING ROLLERS appeals to contractors because they give uninterrupted service and meet all modern specification requirements.

The roller units are full floating, on husky frames—built for long hard use.

Send for complete details and prices.

BLAW-KNOX DIVISION of Blaw-Knox Co.
FARMERS BANK BLDG. PITTSBURGH, PA. 19

BLAW-KNOX TAMPING ROLLERS

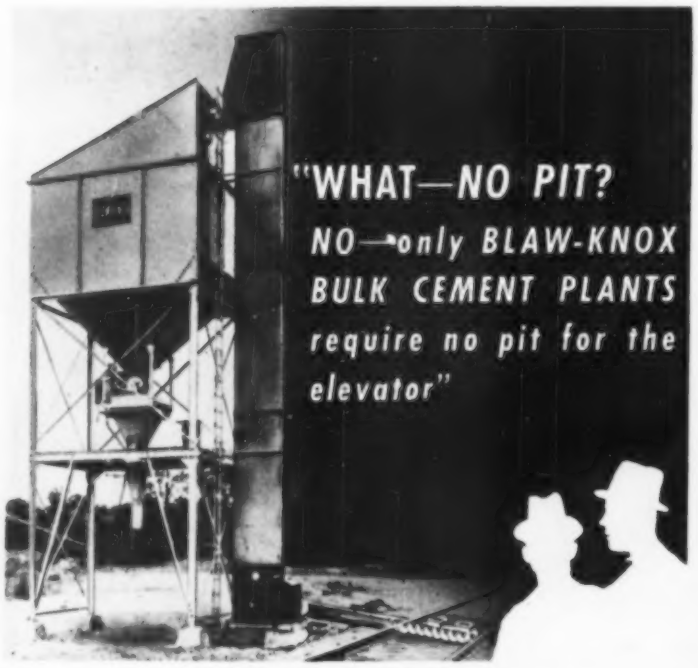


● Blaw-Knox Self-Aligning ROAD FORMS are the best buy for any contractor because: (1) they are easier and quicker to set; (2) they have a more positive staking system; (3) they are stronger and more durable; (4) they eliminate delays at the paving mixer.

Full details of these remarkable Road Forms are in Blaw-Knox Bulletin No. 1557. Send for a copy.

BLAW-KNOX DIVISION of Blaw-Knox Company
FARMER'S BANK BUILDING PITTSBURGH, PENNA.
Offices and Representatives in Principal Cities

BLAW-KNOX ROAD FORMS



Blaw-Knox BULK CEMENT PLANTS are the ultimate in portability, speed, and convenience of use and operation. They are *complete units* for unloading, storage, batching and handling of bulk cement—dependable and accurate.

Completely described in Blaw-Knox Catalog No. 1566. Send for copy.

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.
Bulk Cement Plants

FAST WATER!
"MAN... That new WATER IMPELLER in BLAW-KNOX TRUKMIXERS puts water into the batch in one-third the time formerly required."
The new, fast water impeller that won't clog; an accurate and dependable water measuring system; superb mixing action—and assurance of dependable continuous operation make Blaw-Knox Trukmixers the popular choice, and the practical buy for you. Study these features before you decide.
Send for BLAW-KNOX Catalog 1582

BLAW-KNOX BLAW-KNOX DIVISION OF BLAW-KNOX CO. Farmers Bank Bldg. Pittsburgh, Pa.
Agitators and TRUKMIXERS

NEVER BEFORE! are

A LINE OF PUMPS WITH OF THESE FEATURES

Never before has there been a self-priming pump that could give you the honest-to-goodness, down-right value and the many features found in the Novo Model "K" Self-Priming Centrifugal Pumps.

FAST PRIMING that is as sure as an old friend for there is nothing to prevent priming if your suction line is tight, and that's priming performance that will last through years of operation.

VOLUME that meets with ease all of the standards set up by the Associated General Contractors of America, Inc., for every size pump. Here is your protection against wild claims for pump volume and operation. The contractors, themselves rated our pumps.

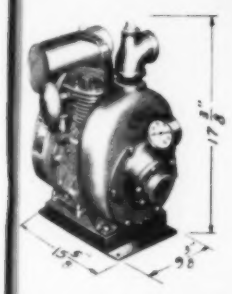
WEAR PLATES. Where extreme wear has occurred, it is a very simple matter to compensate by the removable and adjustable wear plates that are installed on both sides of the impeller.

ACCESSIBILITY. These pumps are almost as accessible as your old coat pockets. You can remove the impeller by just taking off the outer pump plate. None of that clumsy, time-consuming dismantling of the pump or removing the power unit from outfit to get at the impeller.

RELIABLE VALVES. The check valve is not of the usual rubber but is made of Neoprene, that scientific development that has twice the wear-resisting qualities of rubber and has many times more resistance to oxidation. Neoprene resists chemical and oil deteriorating action.

LOOKS. Novos have the smoothest, neatest lines of any self-priming pumps. Their appearance is a credit to any man's job for they reflect sound engineering judgment and the progressive trend of smooth design.

GUARANTEED to meet the A. G. C. standards for self-priming pumps, size for size and in every respect — standards set up by the country's leading and most exacting progressive contractors.



Novo 1½", 3,000 GPH Pump. Weighs 70 lbs.

THE ASSOCIATED GENERAL CONTRACTORS OF AMERICA A G C

THESE PUMPS COMPLY WITH A. G. C. STANDARDS.

Right now is the time to start enjoying the savings you make by using Novo Pumps. Be fair with yourself and take advantage of all their super features that no other pump can give you.

A complete line of Self-Priming Centrifugal Pumps straight through from the light-weight, 3M or 1½"—3,000 GPH Pump to the giant capacity, heavy-duty 8"—125,000 GPH Pump. All can be furnished gasoline or electric powered or less power. - - - - - - -

Mountings are available to suit any job—pneumatic or steel wheels, carrying handles, skids, etc. SEE THEM ALL IN THE NEW BULLETIN NO. 175, FREE ON REQUEST.

NOVO ENGINE COMPANY
LANSING, MICHIGAN

Mail this coupon today!

Send new Bulletin No. 175 on complete line of Novo Self-Priming Centrifugal Pumps with A. G. C. performance tables.

NOVO ENGINE CO., 200 Porter St., Lansing, Michigan.

NAME .....

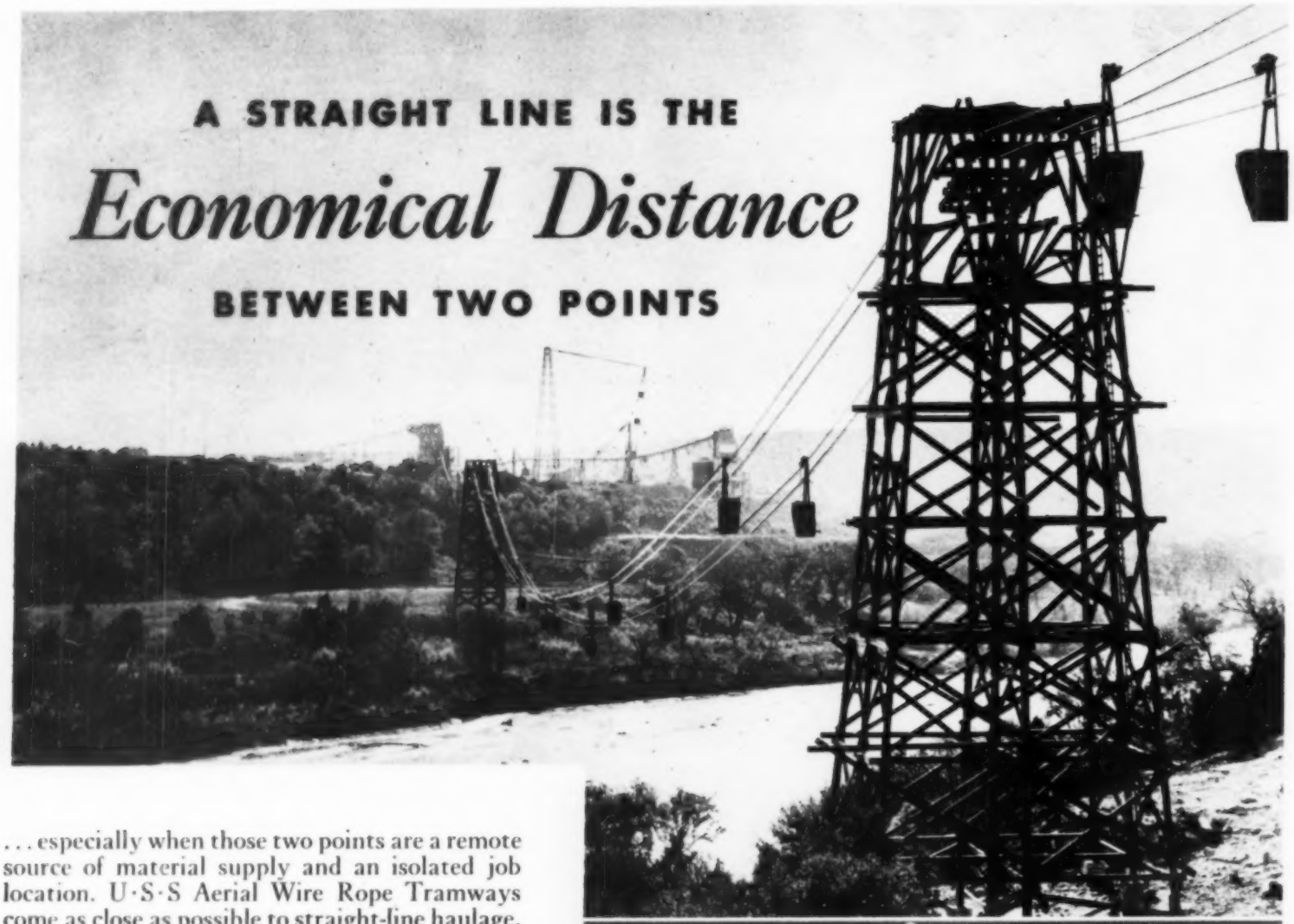
ADDRESS .....

CITY ..... STATE .....

A STRAIGHT LINE IS THE

Economical Distance

BETWEEN TWO POINTS



. . . especially when those two points are a remote source of material supply and an isolated job location. U·S·S Aerial Wire Rope Tramways come as close as possible to straight-line haulage, providing a most efficient, fool-proof and economical system for material handling.

This system is not only more reliable, but is also less costly than other methods of transporting materials, when the two terminals are established for continued use over reasonable lengths of time. Operation costs are lower because of definite labor and power savings. Often this cost on a per ton-mile basis may be brought below 2¢ or 3¢ exclusive of the amortization. These costs vary, of course, due to the many factors involved.

U·S·S Aerial Tramways have been built in lengths ranging from a few hundred feet to many miles, with capacities ranging from 1½ to 300 tons per hour. Even greater capacities are quite feasible. The many types of U·S·S Aerial Tramways available provide a complete range from which to choose the one best suited to your needs.

• • •

FOR YOUR WIRE ROPE NEEDS always ask for American Tiger Brand Wire Rope. Available in either Excellay (preformed) or Standard (non-preformed) construction.

U·S·S AERIAL WIRE ROPE TRAMWAYS

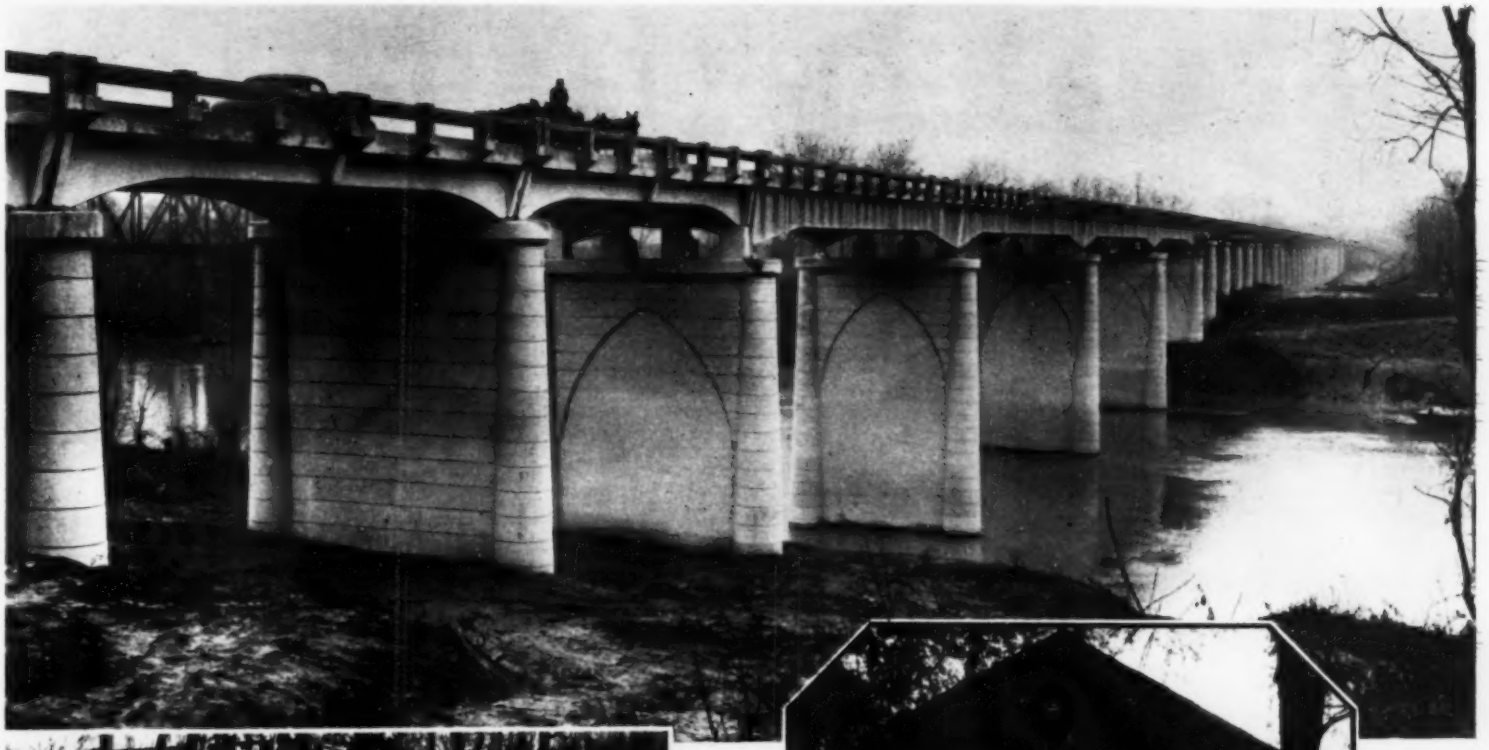
AMERICAN STEEL & WIRE COMPANY

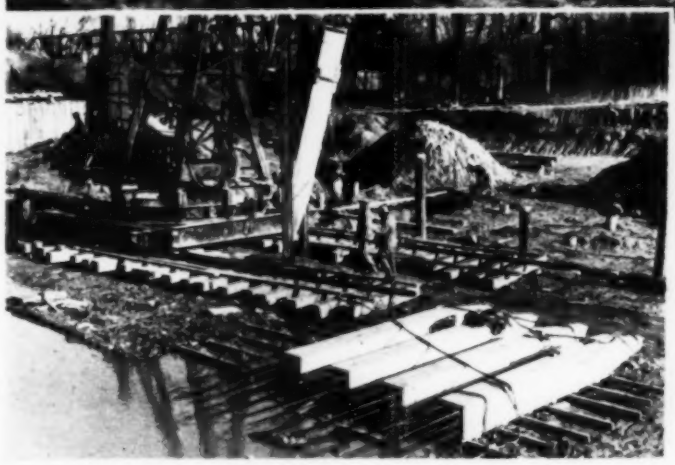
Cleveland, Chicago and New York

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL



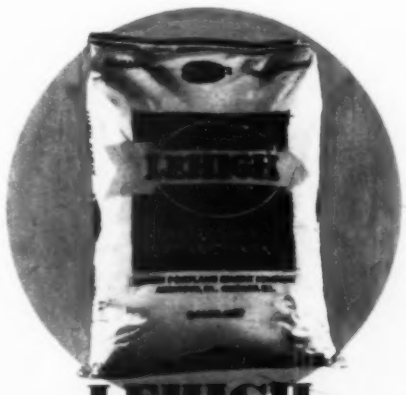


PEE DEE RIVER BRIDGE
Marlboro and Chesterfield Counties, S. C.

GENERAL CONTRACTORS:
Wannamaker & Wells, Inc., Orangeburg, S. C., and McMeekin Construction Co., Craig, Fla.

PILING CONTRACTOR:
Tidewater Construction Co., Norfolk, Va.

Piles driven 10 days after curing instead of 30. Forms removed in 7 days instead of 21. Quick service concrete pier caps and slabs at one end gave quick access to span for placing steel—saved another 20 days.



LEHIGH
EARLY STRENGTH
CEMENT

Modern Methods & Materials

Keep pace with Progress

The old covered bridge is fast becoming a memory. At Pee Dee, S. C., this modern structure designed to meet modern traffic conditions is a symbol of the progress of the times. It exemplifies how modern methods utilize modern materials to meet pressing construction problems.

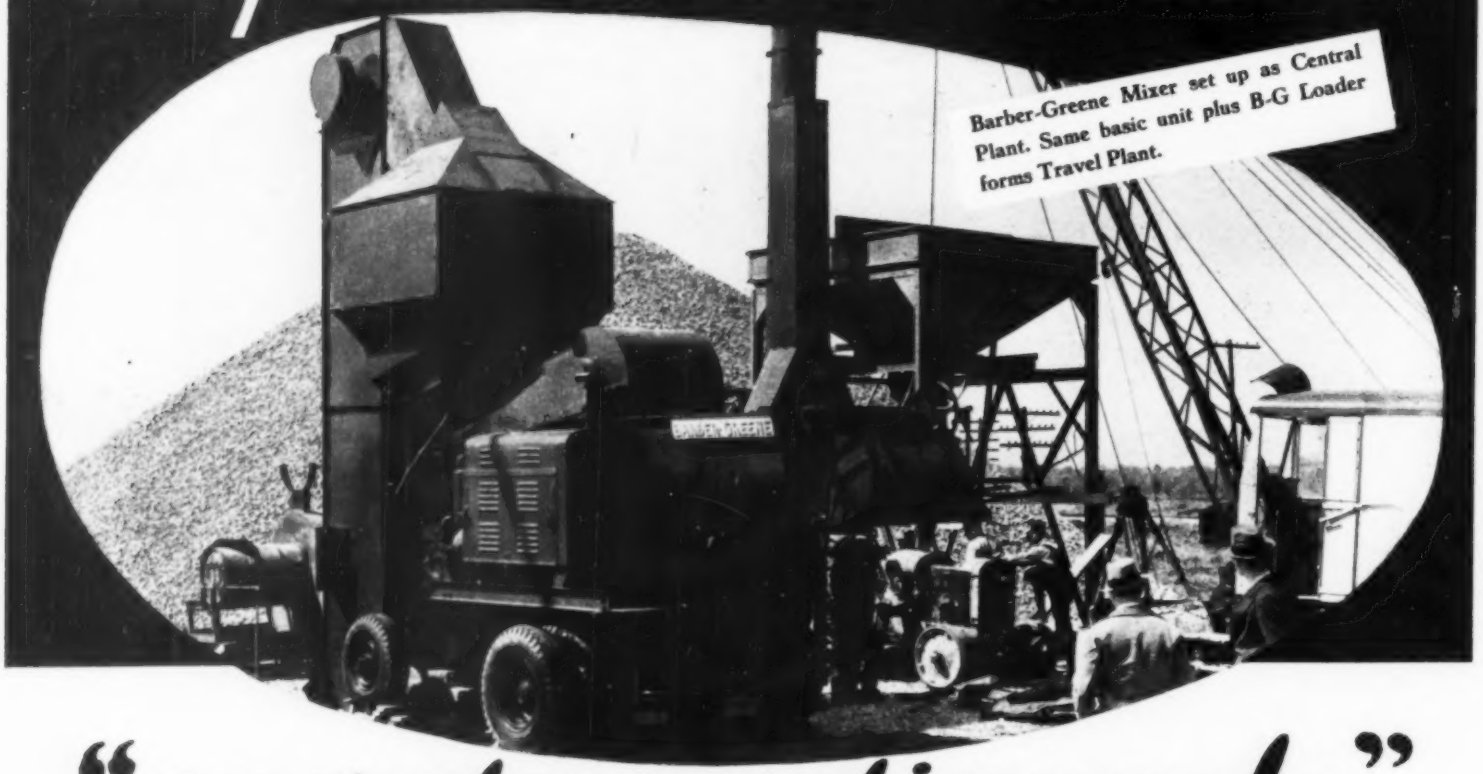
Working against time, the contractor used Lehigh Early Strength Cement to get quick service concrete. Idle time waiting for the concrete to cure was eliminated. A non-interrupted construction schedule was made possible—in fact a bonus was earned by completion prior to the contracted date.

This modern cement, in 24 to 48 hours equals the strength of normal portland cement at 7 days. Its quick strength can be utilized to save time and reduce expense in any type of construction. It lowers overhead costs, it makes possible the quick stripping and re-use of forms, thus saving on form costs.

The Lehigh Service Department will gladly answer your specific inquiries.

LEHIGH PORTLAND CEMENT COMPANY
Allentown, Pa. Chicago, Ill. Spokane, Wash.

Why the Barber-Greene



"operates continuously"

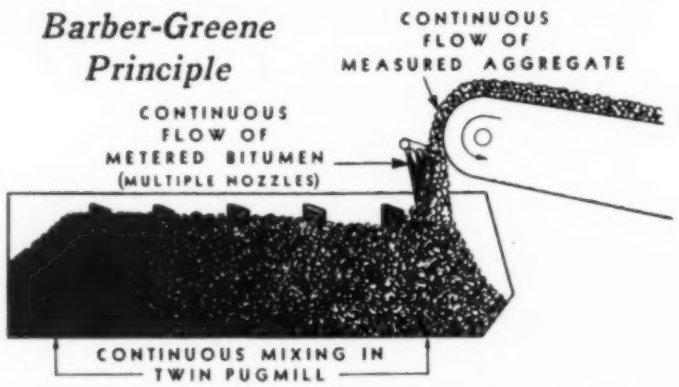
CONTINUOUS operation allows the B-G Mixer to handle a relatively small amount of material at any given moment. This permits a machine of comparatively small size and weight for its high daily capacity.

Continuous operation means that the aggregates and bitumen are fed into the starting end of the twin pug mill in *continuous* small streams of the correct proportions—not in batches or surges that require more power, and longer mixing.

Continuous operation means less segregation—more thorough mixing. The twin pug mill is not required to mix mass lumps of the individual materials in the limited time available.

The human element is practically eliminated. Once set, the proportions remain constant thru *continuous* volumetric measuring. The mixing time, being *continuous* remains constant, and the capacity per hour stays closer to the top limit. A *continuous* machine requires less operating skill, and the consistency of its speed greatly simplifies job co-ordination.

Barber-Greene Principle


CONTINUOUS FLOW OF MEASURED AGGREGATE
CONTINUOUS FLOW OF METERED BITUMEN (MULTIPLE NOZZLES)
CONTINUOUS MIXING IN TWIN PUGMILL

Easily set-up and knocked down, the Mixer can be towed behind a truck.

The B-G Mixer connected to the B-G Bucket Loader forms the finest Travel Plant made. 39-23

Phone, write, or wire for complete information. There is no obligation. Barber-Greene Company, Aurora, Illinois.

BARBER-

B-G FINISHERS

BARBER-GREENE users are the most enthusiastic boosters for the Barber-Greene Tamping-Leveling Finisher. The Engineers approve and praise the level mat compacted to stay level by the B-G Tamper. The Contractors not only have the satisfaction of laying the finest road, but enjoy the substantial cost savings effected by doing the job once—right with the minimum of labor. Write for the B-G Finisher Booklet. Q5

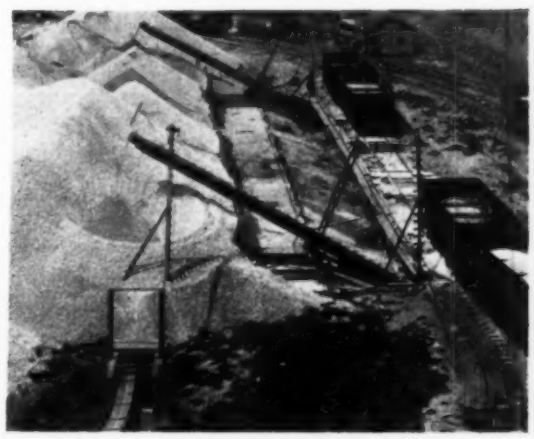
B-G LOADERS

BARBER-GREENE Bucket Loaders offer by far the cheapest means of loading bulk materials from ground storage to trucks. They may be equipped with a vibrating screen as shown here, loading and screening simultaneously. This Barber-Greene has many distinctive advantages which deserve your investigation. Q2

B-G DITCHERS

BARBER-GREENE Ditchers are made in four different models: The Standard machine for general ditching up to 8′ 3″ deep and 24″ wide, The Pipe-Line Special for fast cross country work, The Utility Special with the Off-Set Boom for working in close quarters, and The Service Special for easy trailer hauling, and small service jobs. Q3

B-G CONVEYORS



BELT Conveyors are recognized as the cheapest means of transporting materials over short distances. In addition to this important feature, Barber-Greene Belt Conveyors have many other advantages. Their Standardized Sectional Construction gives easier, faster erection, more flexibility, prompt shipment from stock, and high resale value. Barber-Greene Belt Conveyors are built for contracting. Q4

BARBER-GREENE COMPANY, AURORA, ILLINOIS, U. S. A.

-GREENE

STANDARDIZED MATERIAL HANDLING MACHINES

THESE FLEET OWNERS FIND IT PAYS TO USE . . .

THIS AUTOMOTIVE ENGINEERING SERVICE

BUS COMPANY GETS 11.5% MORE MILES-PER-GALLON

WOULD 11% of your gasoline bill be worth saving? Then take a tip from the City Coach Company's experience at Ft. Madison, Iowa. Just two months after a Standard Automotive Engineer started checking this bus fleet, C. F. Winkle of the City Coach Company writes:

"We availed ourselves of this service early in January, 1939. By the work your engineer was able to do in checking up on our equipment and cooperating with our maintenance department we have already increased our gasoline mileage 11.5%."

That is an average saving. This Engineering Service has helped many operators reduce costs 20% and more. If you are located in the 13 Midwestern states served by these Engineers, it will cost you nothing but a phone call to your local Standard Oil (Indiana) office to put one of them to work on your fleet.

CONTRACTORS find that it pays to keep in touch with their Standard Automotive Engineer *throughout* the construction season. Many things can happen to equipment after the Spring tune-up. For one thing, operation on the job shows up weak spots in units that passed inspection in the shop. The Standard Engineer can make his tests right in the field. He can help you avoid breakdowns on the job when they would cost the most in repairs and lost time. Find out from the local Standard Oil (Indiana) office where you can reach the nearest engineer.

MODERN DELIVERY FLEET MAKES 22.3% SAVING

Oil mileage safely increased 33% between changes. One and one-half more miles per gallon of gasoline. These were just two of the more important items in the 22.3% saving made on the Producers Creamery fleet at Benton Harbor, Michigan. It came about when Paul Smith, Maintenance Superintendent, and the Standard Automotive Engineer started looking for the cause of high gasoline consumption and poor idling on some of his trucks. The trucks in this delivery fleet were modern. Shop methods and equipment were up-to-date. Yet, Standard's Engineering Service and products helped make this worth-while saving.

TRANSFER COMPANY FIGURES AN 18% SAVING

Roy Meadows, President of the Meadows Transfer Co., Des Moines, Iowa, writes:

". . . our truck No. 13 operated 315,000 miles on the original crank shaft, connecting rods, pistons and pins. Neither the rods nor main bearings were adjusted in that time . . . this remarkable record, we feel, is due to the exclusive use of Iso-Vis Motor Oil.

". . . we found that our chassis repair costs have dropped 20% since March, 1937, when we started using Standard Greases.

". . . We also found the service of the Standard Oil Engineer most important. The equipment he uses is portable, which enables him to check trucks under actual operating conditions, thereby insuring maximum mileage.

"In short, Standard Products and Standard Oil Engineering service have reduced our operating costs 18%."

Let one of these Engineers show you, on your own equipment, just how it's done. It will cost you nothing if you operate in the 13 Midwestern states served by these Engineers. Call your local Standard Oil (Indiana) office or write 910 South Michigan Avenue, Chicago, Illinois.

FIRST IN SERVICE
FOR FIFTY YEARS
STANDARD OIL (IND.)

STANDARD OIL COMPANY (INDIANA)

AUTOMOTIVE ENGINEERING SERVICE

LOWERS MILEAGE COSTS

Three more makes Eight

NORTHWESTS

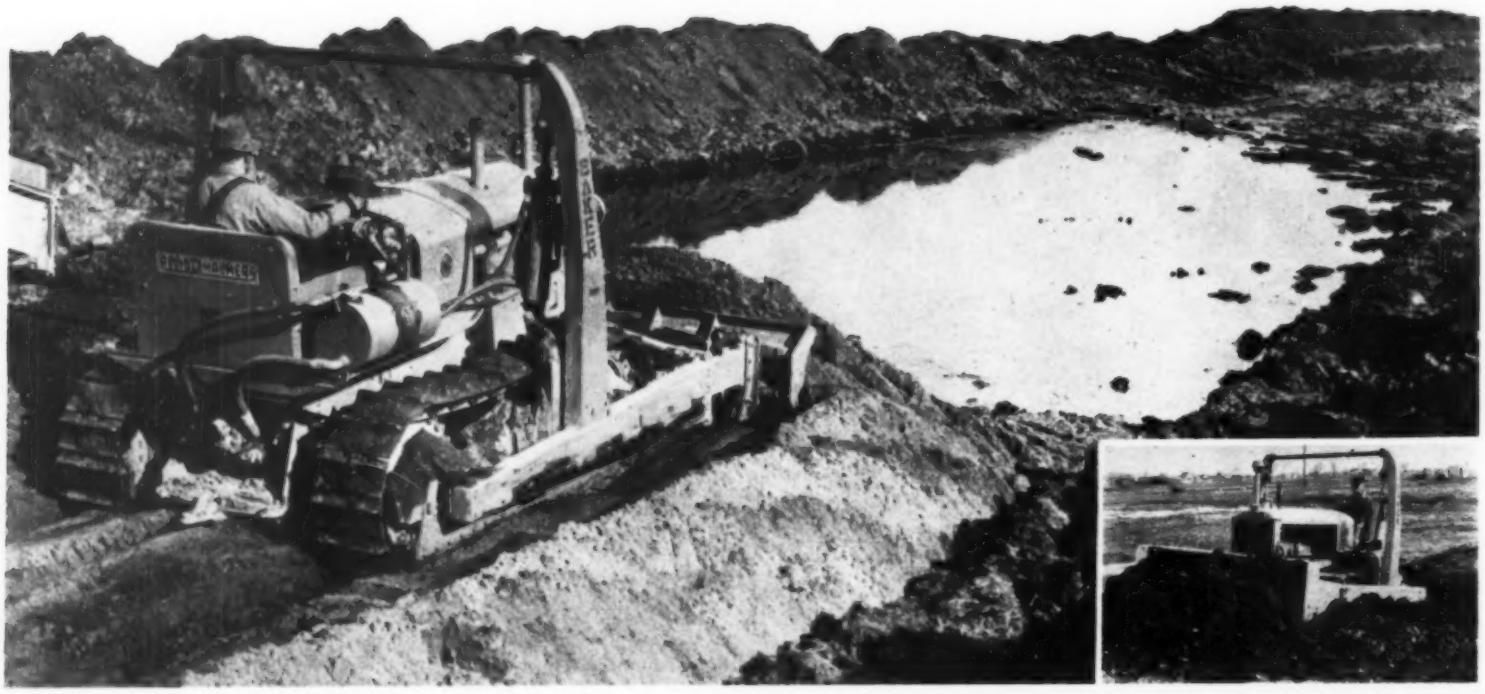
for
THOMAS
PROCTER
Long Branch
N.J.

THREE IN 1937
TWO IN 1938
THREE IN 1939

YOU don't do that with "Sales Talk!" Profitable machinery plays a large part in successful contracting and that's why one out of every three Northwests sold is a repeat order.

NORTHWEST
ENGINEERING COMPANY
1728 Steger Bldg., 28 E. Jackson Blvd.
Chicago, Illinois

Bulldozer Performance at Its Best!



Baker Gradebuilder handling a filling job on a Minnesota highway. De Ruyter Bros., contractors, Willmar, Minn.

Excavator type (Curved Blade) Bulldozer.

Standard type (Straight Blade) Bulldozer.

Reversible (Curved Blade) Gradebuilder.

BAKER HYDRAULIC BULLDOZERS and GRADEBUILDERS

There's a difference in the performance of Baker Bulldozers that the operator can feel instantly. Smooth control, quick response and the ability to do the job exactly as it should be done are making Bakers favorites everywhere.

Baker Bulldozers and Gradebuilders with their convertible moldboard feature are being used on an increasing variety of jobs — slush pit digging in oil fields, highway work, dam construction, coal stripping, clearing — wherever there is leveling or spreading work to be done.

No wonder there is an increasing number of Bakers in the field. No others have so many essential features — tremendous down pressure — connected twin cylinder operation—direct blade lift—smooth hydraulic control and strength for the toughest jobs.

Ask for bulletins on Bulldozers, Hydraulic Scrapers and other Baker products.

THE BAKER MFG. CO.
568 Stanford Ave.
SPRINGFIELD, ILLINOIS

NEW BAKER HYDRAULIC SCRAPERS

Now available in 4 sizes, from 3 to 10 cubic yards capacity. All are built on important new principles which permit loading to capacity with much less power. All dump cleanly and spread as they dump. Now you can get increased yardage at a lower investment and reduced operating cost.

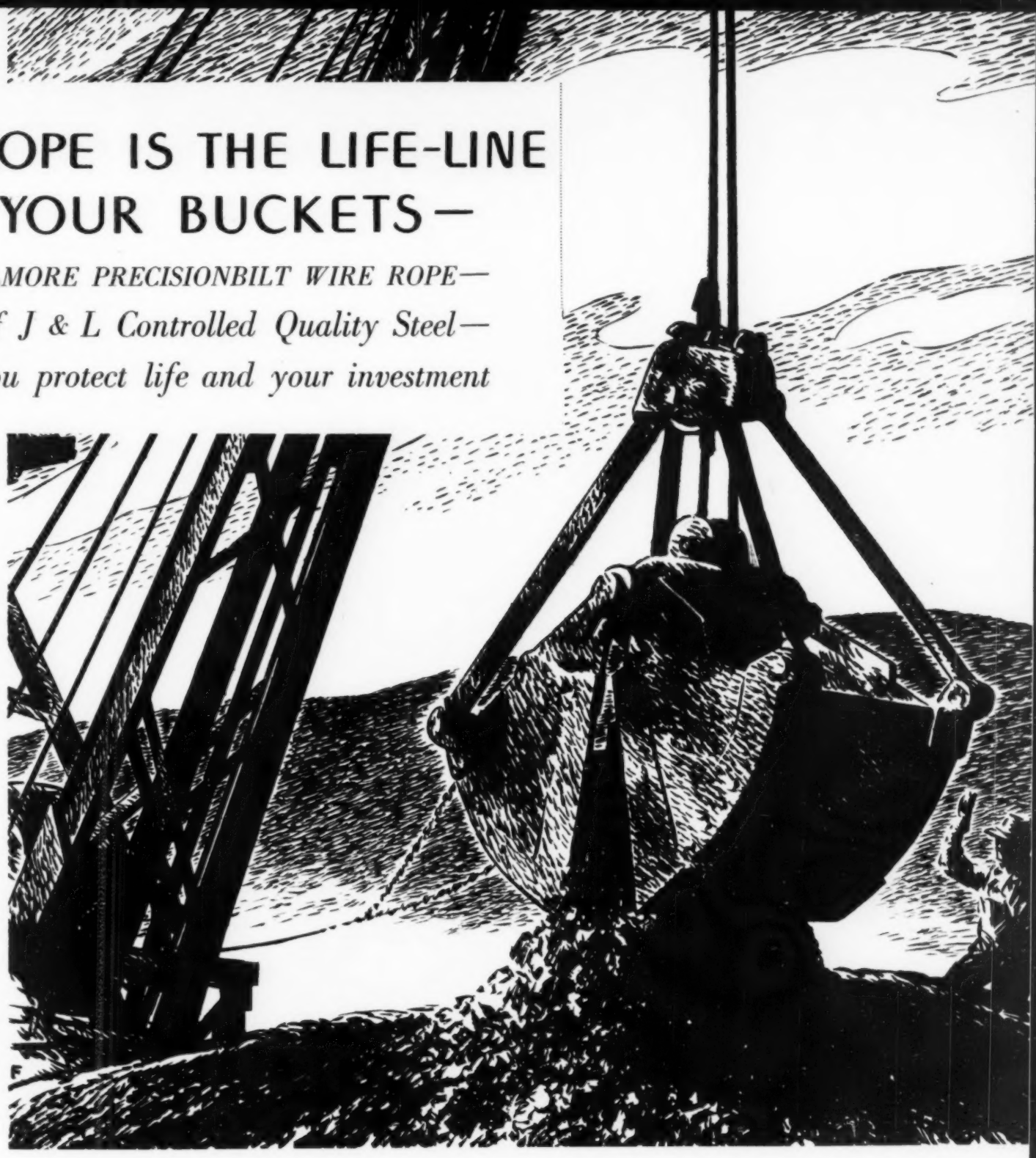
The Kind with the FLAT DIGGING ANGLE

• BAKER TRACTOR EQUIPMENT •

BULLDOZERS • GRADEBUILDERS • SCRAPERS • ROOTERS • ROAD DISCS • MAINTAINERS • SNOW PLOWS

WIRE ROPE IS THE LIFE-LINE ON YOUR BUCKETS—

and GILMORE PRECISIONBILT WIRE ROPE— made of J & L Controlled Quality Steel— helps you protect life and your investment



Good wire rope is good insurance against costly breakdowns, delays and injuries. And good rope — rope that lasts and gives long, safe, economical service — must be formed with precision from wire drawn from the finest steel.

In Gilmore Precisionbilt Wire Rope — made from J & L Controlled Quality Steel — you get this combination of security and service. For the quality of J & L Steel is controlled from the grading of the iron ores to the drawing of the steel wire. And this quality-controlled wire is formed into Gilmore Rope on the latest type of machines — in the country's most modern wire-rope plant — by skilled men who work with the knowledge that sometime in the life of every rope they make, human life may depend upon its performance.

There is a Gilmore Precisionbilt Wire Rope for every contracting and mining need. Write today for our catalogue — describing the full range of ropes we make for the contracting and mining industry.

J&L STEEL

J & L—PILOTS THE COURSE OF CONTROLLED QUALITY IN STEEL

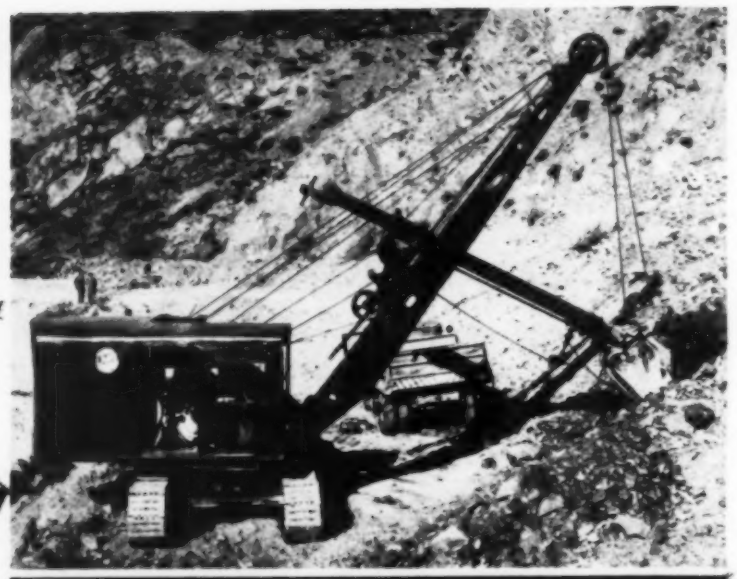
JONES & LAUGHLIN STEEL CORPORATION

GILMORE WIRE ROPE DIVISION

MUNCY, PENNSYLVANIA

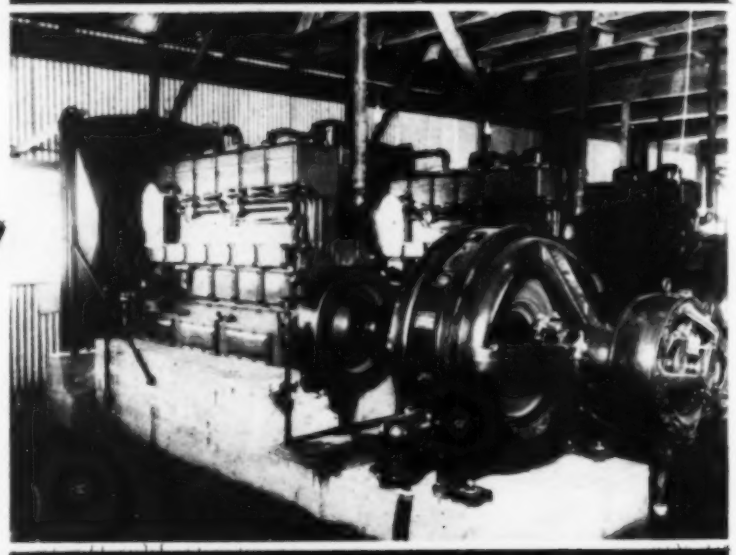
J & L — PARTNER IN PROGRESS TO AMERICAN INDUSTRY

Insure your Profits



Cummins Diesel power holds on like a bull-dog when digging and crowding in hard pan or rocky soils . . . its close governing assures a steady, smooth power output . . . more swings and sumps . . . cheaper dirt moving.

here **The Cummins Diesel is the proved power for shovels and draglines—any size from 1 to 5 yards. The engine's high torque at low rpms. gives you more power to dig and crowd, faster swings and dumps—more dirt moved—cheaper dirt.**



The nation's largest contractors now use Cummins Diesel power for generating, pumping, running compressors. Standardizing on Cummins Diesel power has given them not only a sharp reduction in fuel and maintenance, but an added saving in parts and labor.

and here **The Cummins Diesel's instant cold starting makes its power immediately available. You have the same "readiness to serve" that you expect from a power line. The engine doesn't tire on continuous day and night duty.**

and here **The Cummins Diesel's dependability assures an unbroken working cycle for your trucks. A seven-year record for dependable performance substitutes proof for expectancy.**

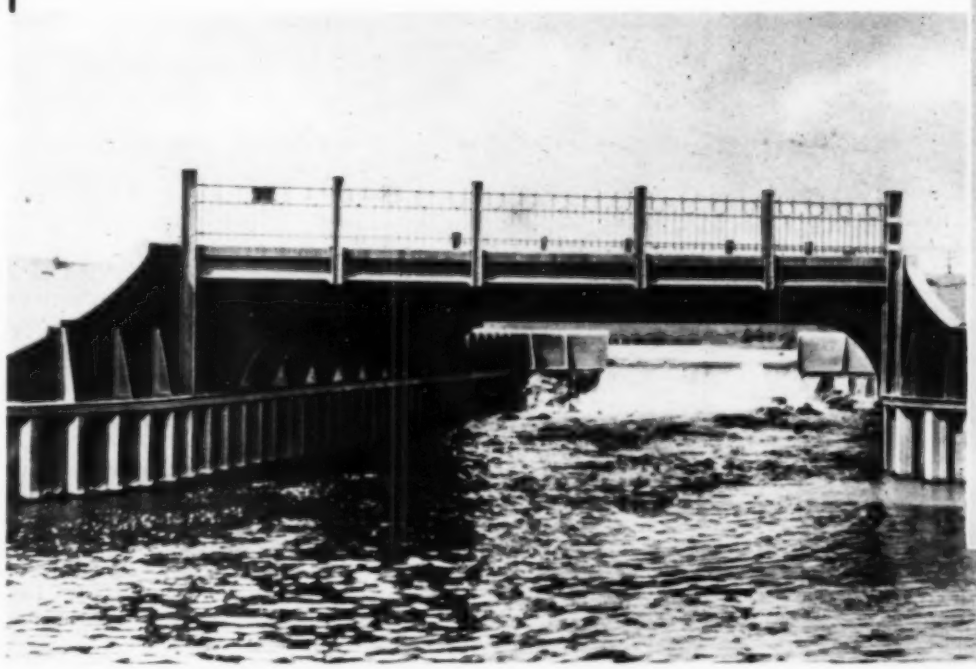
Ask for the FREE bulletins, "Powered for Profit" and "Job-Test Evidence." Cummins Engine Company, 1716 Wilson Street, Columbus, Indiana.

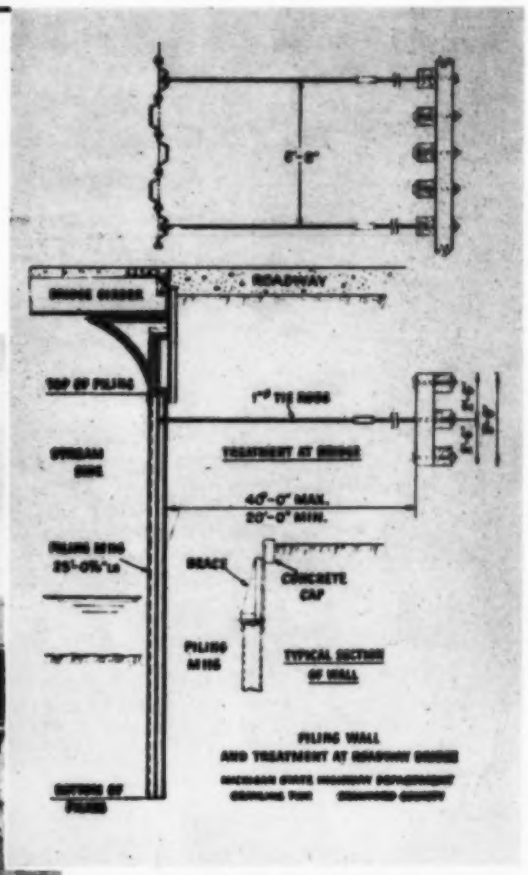
With Cummins Diesel power in your trucks, you estimate dirt-moving costs more accurately . . . meet time schedules more surely . . . reduce lost time and "out for repairs" to a minimum.

CUMMINS
Dependable
DIESEL

Here's an interesting "ALL STEEL" Bridge . . .

TWO STEEL SHEET PILING ABUTMENTS
STEEL DECK GIRDER SUPERSTRUCTURE
STEEL AND CONCRETE FLOOR
STEEL SHEET PILING SPILLWAY DAM





Designed by the Bridge Division of the Michigan State Highway Department under the supervision of Murray D. Van Wagoner, State Highway Commissioner.

General Contractor: F. C. Atlewed, Detroit

THE construction of this single span over the Au Sable River at Grayling, Mich., is clearly illustrated in the plan and cross-section above.

4475 lineal feet of U·S·S Steel Sheet Piling, Section M 116 (16″ interlock, 5″ arch, ⅜″ web and flange, 36 lbs. per lin. ft.) were used on this job.

The piles, 25′ long, were driven by No. 6, 3000 # Steam Drop Hammer, through timbers, logs, etc. on an old mill site, into sand, an average penetration of 18 ft. Depth of water 3 ft.; freeboard 3½ ft. Total length of wall 224 ft. Note particularly the all-steel construction of the abutments, with U·S·S Steel Sheet Piling under the superstructure supporting a load of 9 tons per lineal foot of wall.

Bridge floor is U·S·S Tri-Lok, a light, rugged combination steel-and-concrete floor, the forerunner of the famous U·S·S I-Beam-Lok Floor.

If you are designing bridge piers and abutments — piers, docks and wharves — bulkheads and retaining walls—beach and shore protection—lock and dam walls and cut-offs—trench walls — cofferdams for locks, dams and dry docks, more than likely you can do the job more efficiently and at lower cost with U·S·S Steel Sheet Piling. Call Carnegie-Illinois for expert cooperation.

Look for this symbol on steel products. It represents the highest quality, the finest metallurgical service.

STEEL SHEET PILING

CARNEGIE - ILLINOIS STEEL CORPORATION

Pittsburgh and Chicago

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Big Machine Value In These Small Shovels

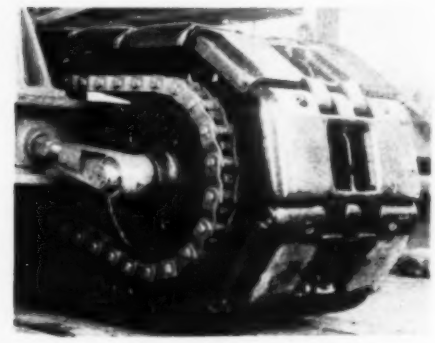
B. R. Acker Co., Inc., prominent road contractor of Takoma Park, Maryland, is but another contractor who has recently switched to BAY CITY and is experiencing new economies in excavation—getting *big machine value* from his ¾-yard shovel. The simplicity of design, accessibility, ease of operation, speed and power of these rugged machines, fully convertible without machinery change are establishing new records of performance and economy. If you want real pay-dirt at lower operating and maintenance cost, we urge you to investigate the many advantages of the BAY CITY (⅜ to 1¼ yd.), as others are doing, before buying your next shovel. Start now by writing for Catalog H-2—no obligation to learn about *Big Machine Value in Small Shovels.*

BAY CITY SHOVELS, Inc., BAY CITY, MICHIGAN

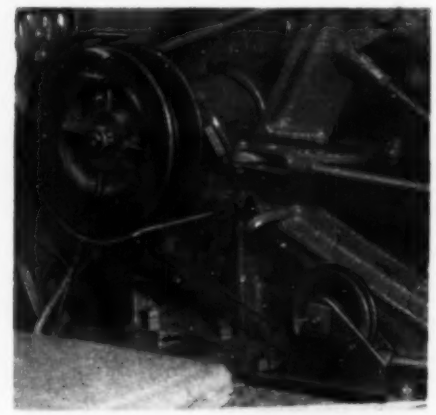
Export Office: H. M. Hein, 330 W. 42nd St., New York, U.S.A. (Oparo)

Before ordering his second BAY CITY, Mr. B. R. Acker writes *"We are more than satisfied with our new BAY CITY. It is averaging better than 100 yards an hour and operating expenses are at a minimum which means we are digging pay-dirt."*

Here are a few of the many cost reducing advantages—standard on the BAY CITY



This unique out-board bearing on crawler drive is but one of many ways in which maintenance cost is reduced in standard construction.



The simplicity of operating this instantaneous Electric Dipper Trip adds from 10 to 15% to daily yardage—there's no extra charge.

Powerful one-piece chain crowd provides wider working ranges at lower maintenance costs—fewer delays.

Helical gears throughout give quiet operation with greater tooth contact affording increased power.

Unit-cast alloy steel car-body and revolving table to absorb shock and vibration—no deadweight.

Fast, easy travel and steering under full power in either direction by simply applying pressure on cone clutches that operate brakes—no stopping to shift.

BAY CITY SHOVELS

Established in 1919
A McGRAW-HILL PUBLICATION

Construction
Methods and Equipment

ROBERT K. TOMLIN, Editor

Volume 21 | June, 1939 | Number 6

BULK CEMENT DOCK

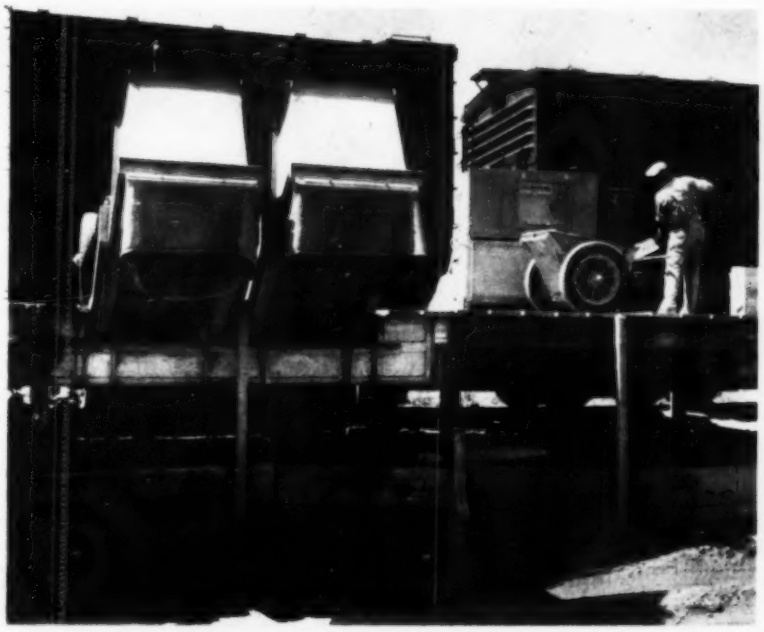
Has Constantly Balanced Dumps Mounted on Rockers

By E. T. JENSEN

Engineer, Western Contracting Co., Sioux City, Ia.

FOR THE LOADING of bulk cement into batch trucks on concrete highway projects, the Western Contracting Corp., of Sioux City, Ia., has developed the cement "dock" illustrated herewith. Among its advantages are convenient portability and need for very little maintenance.

The cement dock is built of structural steel shapes and all similar pieces are identical and interchangeable. There are five panels, each 12 ft. long, which may be arranged in any order to suit the particular job requirements. The six piers are all identical and interchangeable and of such weight as to be easily handled by two men. The joists are lightweight wide-flange sections and simply rest in standard notches on top of the piers. Longitudinal sway bracing is provided in both the scale panel and the dump panel by the use of deep trussed joists. The entire cement dock is assembled without the use of bolts or pins thus eliminating the common trouble caused by losing small parts.



(1) **WEIGHING A BATCH** of bulk cement **(left).** Dumps are lifted ready for a truck to pass under them.

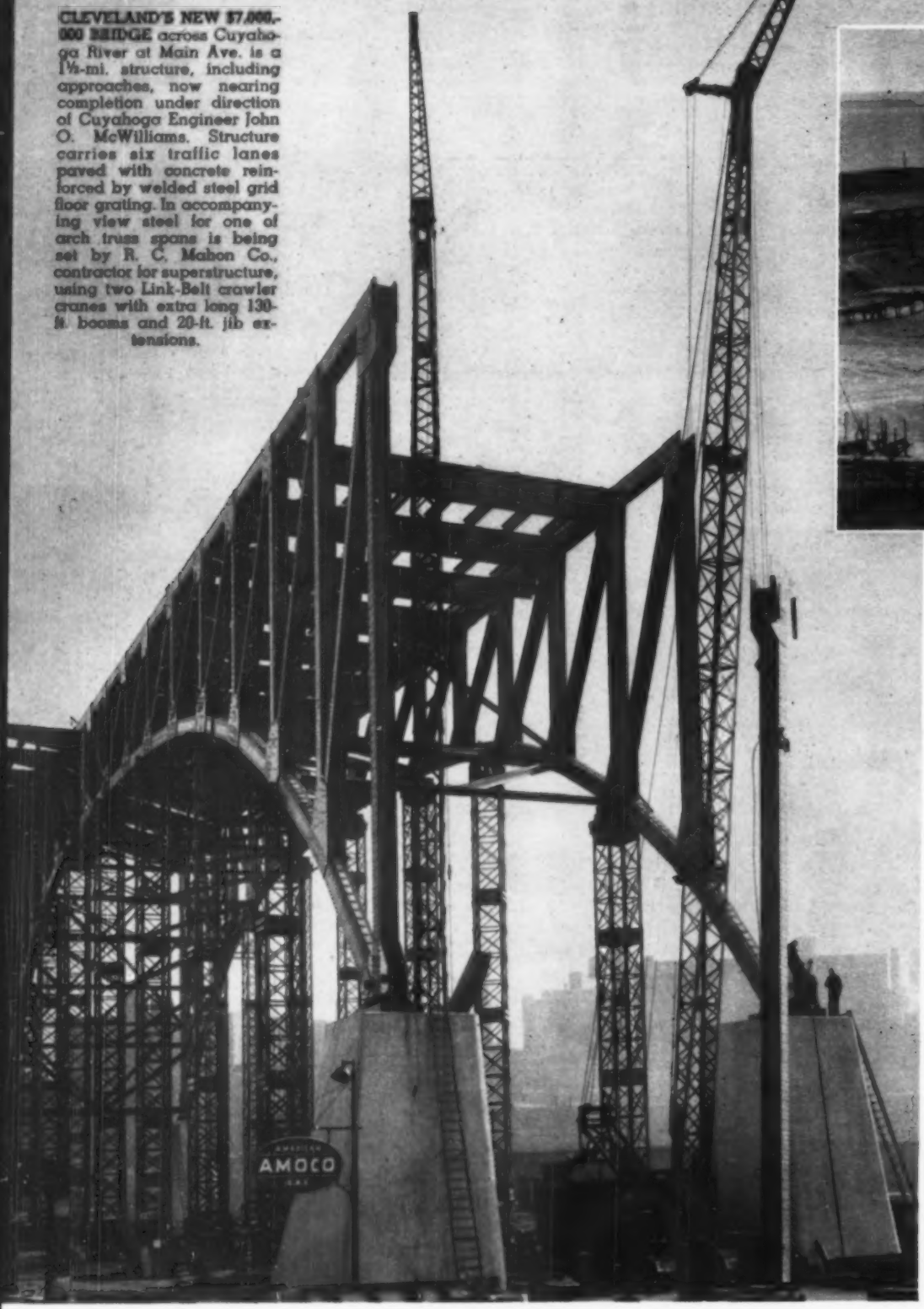
The chief feature of this cement dock is the use of constantly-balanced dumps. Two individual dumps are used and they are so placed as to be of use for either single or double batch-trucks. The dumps are mounted on rockers which operate on a three-point balance. This permits the use of a constant counterbalance which is built into the dump chassis. The three balance points are so arranged as to keep the dump

(Continued on page 106)

(2) **DUMPS HAVE BEEN CHARGED** with proper weights of bulk cement by pneumatic-tired hand carts.

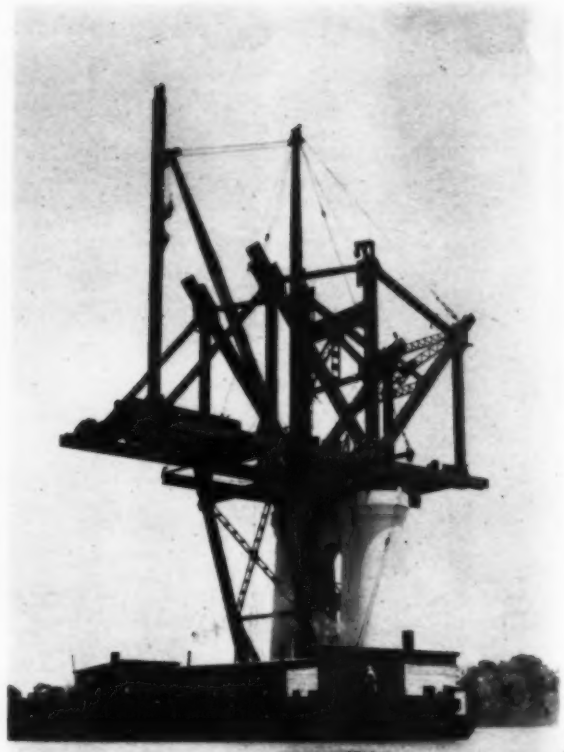
(3) **TWO-BATCH TRUCK RECEIVES CHARGES** of bulk cement as dumps are lowered. Dumps do not rest on truck body.

This Month's

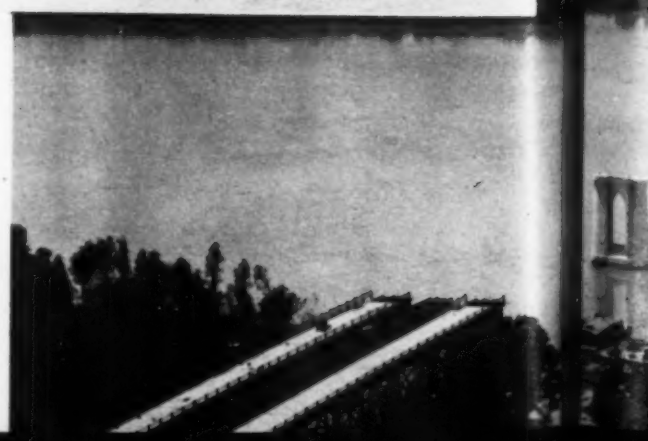


CLEVELAND'S NEW $7,000,000 BRIDGE across Cuyahoga River at Main Ave. is a 1½-mi. structure, including approaches, now nearing completion under direction of Cuyahoga Engineer John O. McWilliams. Structure carries six traffic lanes paved with concrete reinforced by welded steel grid floor grating. In accompanying view steel for one of arch truss spans is being set by R. C. Mahon Co., contractor for superstructure, using two Link-Belt crawler cranes with extra long 130-ft. booms and 20-ft. jib extensions.

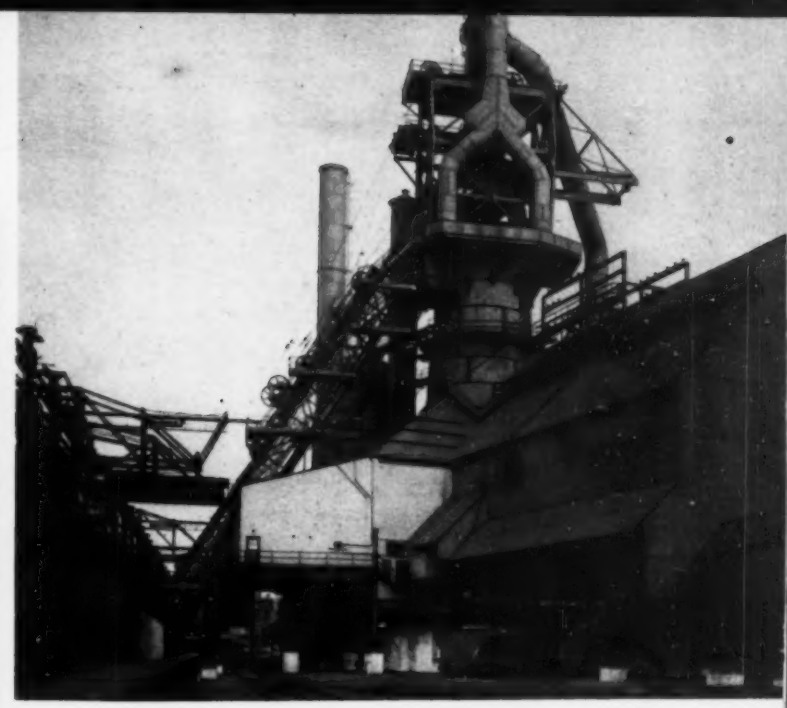
CONSTRUCTION OPERATIONS RESUMED IN DAMAGED AREA of Fort Peck dam by U. S. Engineer Department, following slide of material caused by foundation failure last September. Steel sheetpiling is being driven along axis of dam in foreground while rolled glacial till is being placed to form core along axis. In hydraulic fill area pump boat is removing water delivered by dredges.



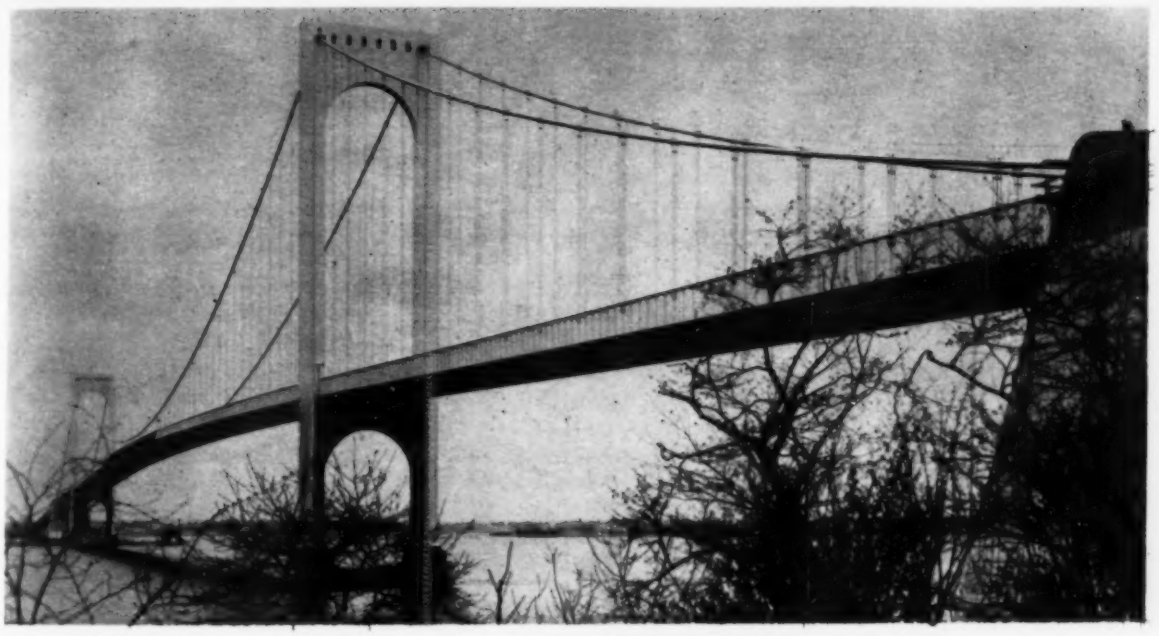
STEEL GRID REINFORCEMENT (below) on 48-ft. roadway of new Highland Park bridge spanning Allegheny River at Pittsburgh, Pa., is embedded in concrete delivered by Blaw-Knox truck mixers. With crew of 6 finishers and 14 laborers, West Penn Sand & Gravel Co. paved 2,400 ft. length of roadway in 10 days. Thickness of reinforced concrete roadway is 4¼ in.



"NEWS REEL"



NEW BLAST FURNACE. with capacity of 1,000 tons of pig iron per day, is completed for Inland Steel Co., at Indiana Harbor, Ind., by Arthur G. McKee & Co., builders of the company's first blast furnace 30 years ago. Substructure of stack, in sandy soil, is carried by tapered piles 90 ft. long; cast house is supported by spread footings, while skip hoist and dust catcher are on H-beam piles.



N. Y. Times Photo

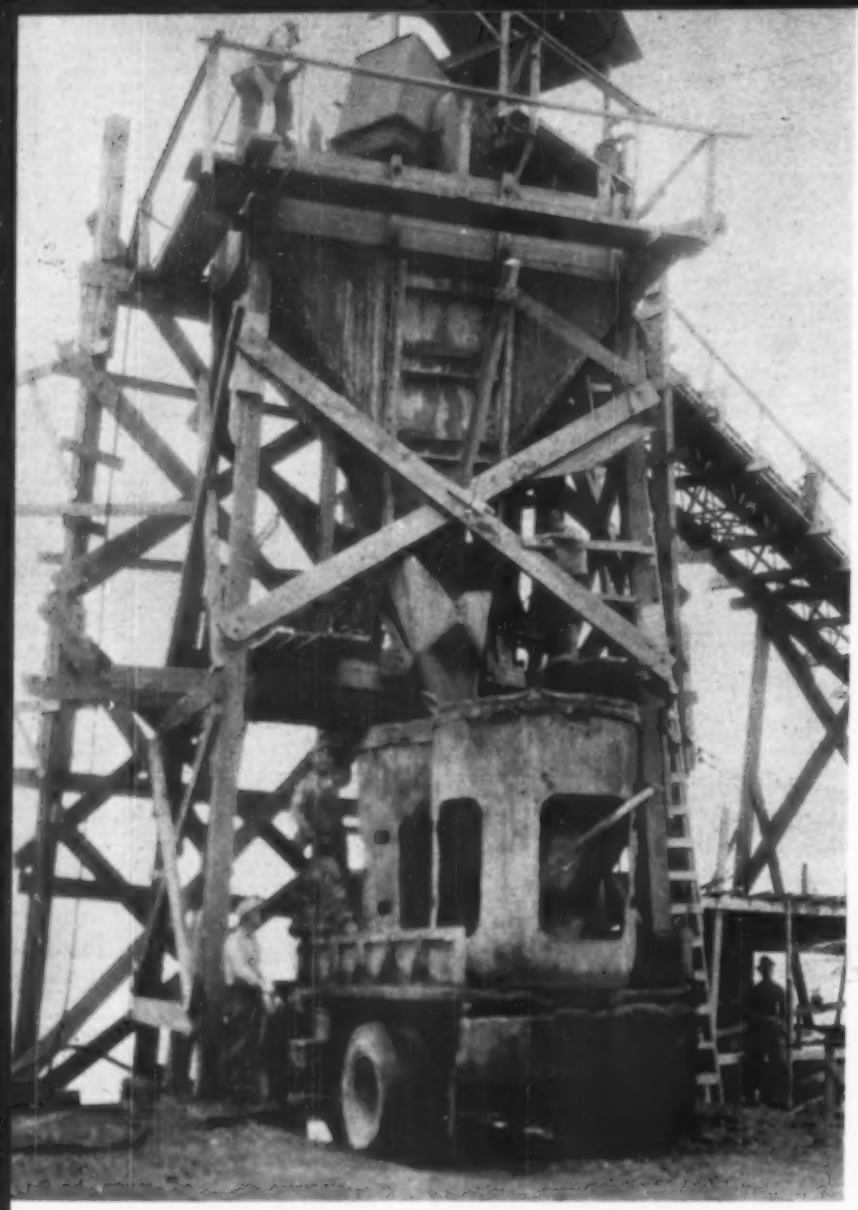
BRONX-WHITESTONE BRIDGE. $18,000,000 structure across East River, New York City, with main cable suspension span of 2,300 ft. and side spans of 735 ft. each, is completed in time to carry traffic to official opening of New York World's Fair, April 30. Paving of 3,850-ft. long concrete roadway on Triborough Bridge Authority project in 12 working days is described elsewhere in this issue.

LAST BUCKET OF CONCRETE (right) is dumped on crest of 270-ft. high Bartlett dam, marking final stage of construction on U. S. Bureau of Reclamation's multiple-arch structure on Verde River in Arizona.

STEEL ERECTION STARTS (inset and below) on new $8,361,000 Mississippi River bridge which Louisiana Highway Commission is building on deep concrete piers at Baton Rouge. All main river piers **(below)** were completed by Kansas City Bridge Co. on April 10, allowing Bethlehem Steel Co. to proceed with superstructure at mid-channel; in foreground appears end of viaduct approach on east bank, with roadway slab paved and railroad track laid. Bridge, with approaches, is 2⅓ mi. long. For Louisiana Highway Commission H. B. HENDERLITE is chief engineer and N. E. LANT is bridge engineer.

DEDICATION of new $11,000,000 Union Passenger Terminal in Los Angeles, Calif., is occasion for colorful pageant depicting history and growth of transportation. View shows Union Pacific train of early vintage, drawn by wood-burning locomotive, passing new Union Terminal.

Wide World Photo



TRANSFER HOPPER at shore end of belt conveyor discharges concrete into 3-cu.yd. bottom-dump buckets transported by trucks.

LONG-BOOM CRANE

Hoists and Places 24,000 Cu. Yd. of Anchorage Concrete In Nineteen 24-Hr. Days

By HAL W. HUNT,

Engineer and Assistant Superintendent, Corbetta Construction Co., Inc., New York, N. Y.

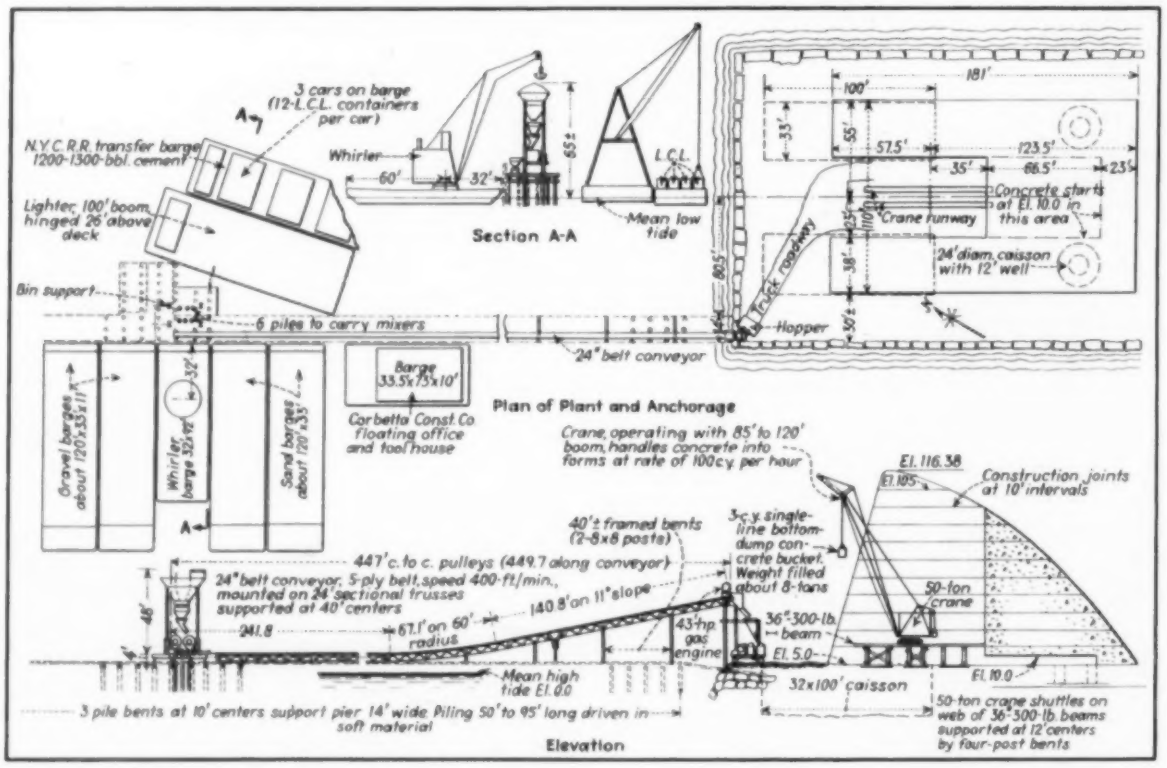
DIFFICULT, DEEP FOUNDATIONS for the Queens anchorage of the Bronx-Whitestone suspension bridge across the East River, New York City, delayed start of anchorage concreting for nearly two months after the scheduled date. To make up this time, the Corbetta Construction Co., New York City, contractor for the anchorage superstructure, was asked by the Triborough Bridge Authority to complete the anchorage in six weeks instead of the three months allowed by the original contract.

To expedite the work it was necessary to change the original plan of erecting a duplicate of the Bronx concrete plant, described in CONSTRUCTION *Methods and Equipment*, September, 1938, pp. 44-47, and to utilize existing facilities of the foundation contractor. Because of shallow water near shore, it was not practical to bring supply barges nearer than 500 ft. to the site of the work. The concrete plant previously used for the Bronx anchorage was set up on piles 90 to 110 ft. long at a point where materials could be handled directly to it from barges.

Concrete Plant — This plant consisted of a 200-ton three-compartment Heltzel steel bin with a 25,000-lb. weigh batcher feeding either of two 5-cu.yd. Rex truck-type Moto-Mixers. Aggregates were fed directly into the bin by a steam whirler crane using a 2½-cu.yd. bucket. Cement, delivered in 25-bbl.-capacity bottom-dump L.C.L. containers on New York Central transfer barges, was placed in the third compartment of the plant bin by a long-boom lighter boat dumping the boxes over a 7x9-ft. opening in the bin top.

Concrete discharged from the mixers on to a 24-in. Barber-Greene belt conveyor previously used for dry aggregates. Some spillage resulted as surge loading actually put the equivalent of 400 tons per hour on the narrow belt, but the method proved generally satisfactory.

Because of unstable foundation conditions and lack of time for erecting other means of placing, a 50-60-ton Lima crawler crane was selected for handling concrete. Material was delivered to the crane by Mack trucks



CONTRACTOR'S LAYOUT for placing 32,000 cu.yd. of concrete in anchorage on narrow peninsula indicates method of delivering concrete by belt conveyor from off-shore mixing plant and placing it in forms with long-boom crawler crane operating on runway in center of the U-shaped structure.

hauling two 3-cu.yd. Blaw-Knox single-line bottom-dump concrete buckets in the bed of each truck. The buckets were charged at an 11-cu.yd. concrete hopper previously used at the mixers in the Bronx set-up and now located at the discharge end of the concrete conveyor. Two trucks hauled about 130 ft. from the hopper to point of service, ordinarily shuttling without turning. Roadways were provided on both sides of the crane to permit the second truck to spot its load before the crane returned the final empty bucket to the other truck.

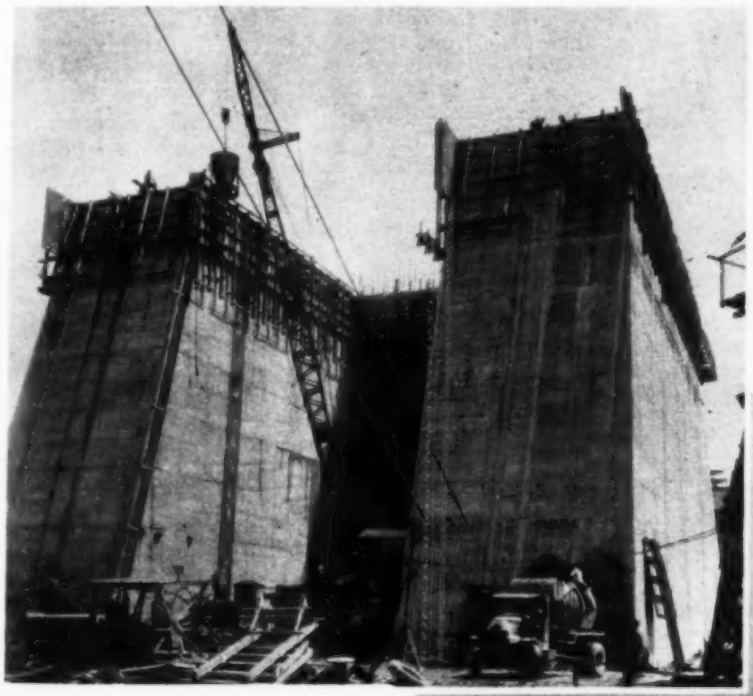
Construction Progress — Lifting a 3-cu.yd. bucket of concrete (8-ton total load) on a single line, the crane worked easily on a 50-ft. radius. Boom lengths varied from 85 ft. to 120 ft. In the period from July 26 to Aug. 12, the crane placed about 24,000 cu.yd. of concrete, equivalent to handling 65,000 tons of material, including the bucket.

Time studies by Louis Corbetta gave the tabulated data below regarding the crane's operating cycle.

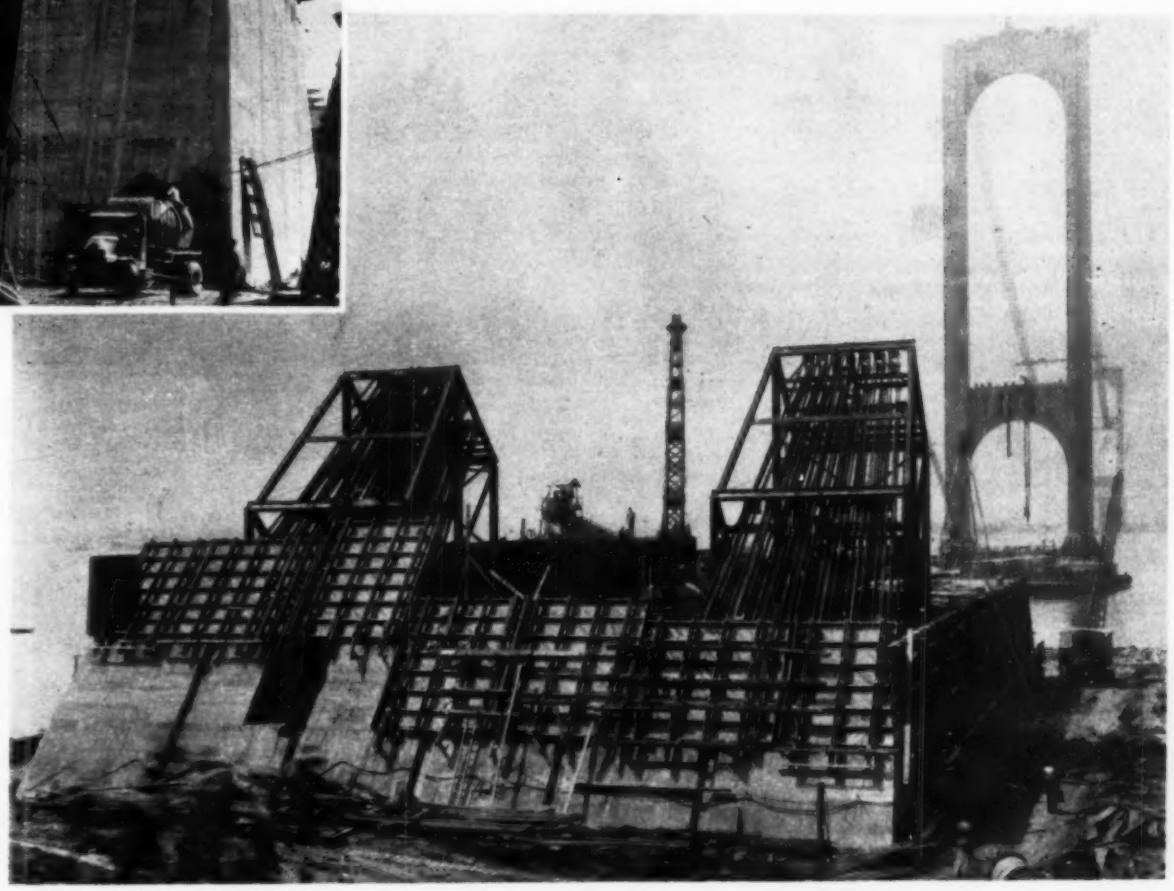
In 31 working days from the time the site was turned over to anchorage construction, the contractor placed a total of 32,000 cu.yd. of concrete, 250 tons of reinforcing steel and 632 tons of relay rail in the U-shaped anchorage, which had a base area equivalent to a 125-ft. square and tapered to almost nothing at the top in a height of about 100 ft.

Relay rails, used as an alternate to structural steel framing in the heavily reinforced beams which carry the weight of the anchorage concrete to the four foundation caissons, were delivered by a lighter to the job, where they were assembled into mats about 6x33 ft. with the aid of prefabricated spacer rails with special lugs.

FROM MIXING PLANT off-shore, long belt conveyor supported on pile trestle carries concrete to transfer hopper, from which it is transported in buckets by trucks to long-boom crane operating in center of U-shaped anchorage.



LONG-BOOM CRANE. advantageously spotted on steel-girder runway in center of anchorage, lifts and places concrete in 3-cu.yd. buckets having total loaded weight of 8 tons.



STEEL ERECTOR sets 600 tons of eyebars to anchor strands of suspension-bridge cables, during one week's interruption of concreting work on anchorage.

Operating Cycle of Crane

Hook bucket	7 sec.
Raise bucket 75 ft., swing 160 deg. and spot	60 sec.
Dump bucket	15 sec.
Return bucket to truck	34 sec.
Unhook and swing into position to hook second bucket on same truck	9 sec.
Unhook and swing into position to hook bucket on other truck in opposite roadway	23 sec.

The mats were stacked on barges in order of use and were placed in position in the forms by long-boom crawler cranes working rapidly in tandem to handle the rails from a barge brought alongside the work at high tide.

Anchorage Eyebars — In addition to the work already mentioned, the American Bridge Co., after some of the concrete had been placed, erected and accurately set a 600-ton eyebar structure (to anchor the ends of the bridge cables) in a period of one week, despite bad weather and hauling conditions. Spinning of the bridge cables was undertaken as soon as the anchorage contractor had completed placing concrete.

Summary—Quantities of materials handled were not large compared to major dam construction for the period involved, but they are almost phenomenal when the small base area of the structure is considered in connection with the fact that all equipment, material storage and construction had to be handled on a peninsula 150 ft. wide by 300 ft. long with an extremely unstable surface resulting from open-caisson dredging operations for the deep foundations.

Quick-Dumping Bucket Trucks and Special Vibrating Machine

Handle Bridge Deck Concreting on Steel Grid Reinforcement

CULMINATING A RECORD of rapid progress by contractors and engineers of the Triborough Bridge Authority on the Bronx-Whitestone bridge, New York City, providing a new traffic route to New York World's Fair, officially opened April 30, the Corbetta Construction Co. concreted two 27½-ft. roadways 3,850 ft. long on the suspension structure in 12 working days, employing for this work a small fleet of quick-dumping bucket trucks and a special electric vibrating machine which consolidated the concrete and embedded the steel in the mass by means of a battery of longitudinal runners operating in contact with the steel grid reinforcement. The contractor finished about 100 lin.ft. of roadway averaging 4½-in. thick (roughly 300 sq.yd.) in each working hour, with maximum daily progress of 960 lin.ft. in a 9½-hr. day.

Truck mixers hauling from a waterfront batching plant under the bridge at the Bronx side of the river delivered concrete to the transporter buckets on the deck at the upper end of the approach structure. Although the high-early-strength concrete used for the bridge deck contained ¾-in. trap rock aggregate and covered the steel grid to a depth of only ¾ in., the finishing machine which followed the vibrator screeded the slab to a smooth surface without difficulty. Concrete was placed on steel-pan bottom forms built into the prefabricated steel grid units.

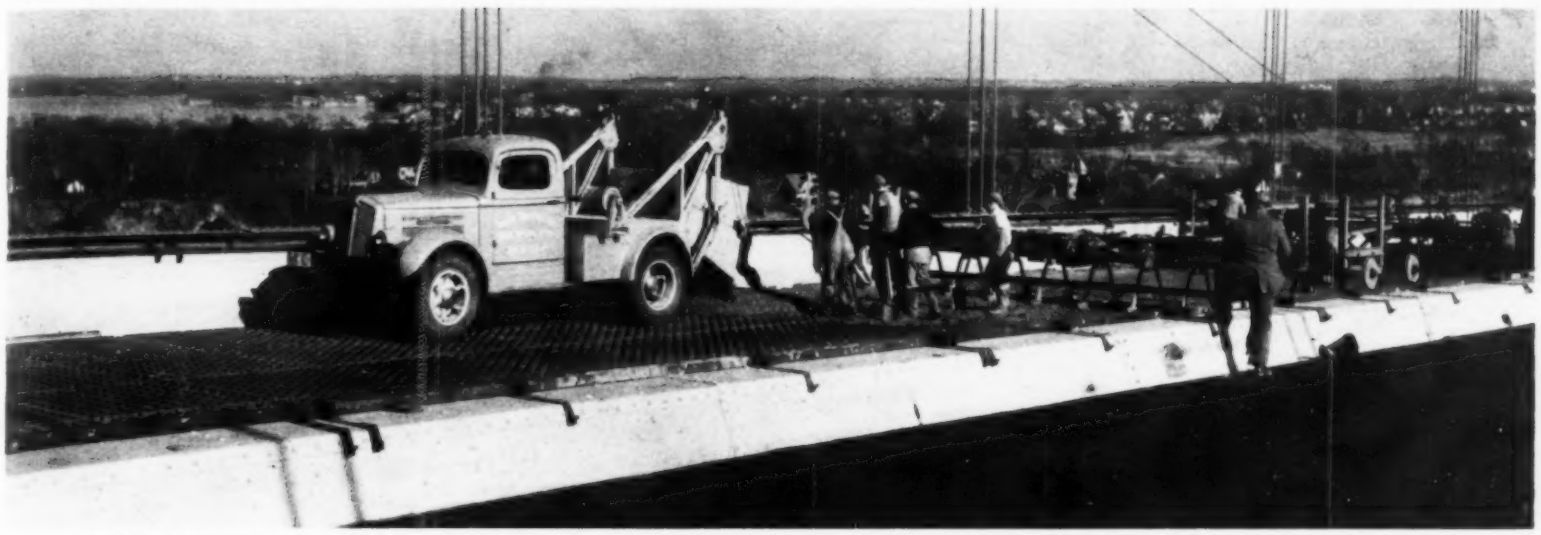
Concrete Delivery — Concrete required for the deck and other work on the bridge was batched from a waterside plant erected on a pile pier near the Bronx tower. Aggregates were delivered by barge and unloaded by crawler crane. Cement, in cloth sacks, was delivered and handled to the height of the batching operation by derrick lighter boat.

FAST CONCRETING of Bronx-Whitestone bridge deck, final step in rapid construction schedule, prepares structure for traffic April 29, one month ahead of original date, coincident with opening of New York World's Fair.

Four or more Rex 4-cu.yd. truck-mixers hauled from the plant to the end of the suspended span, a distance of 1¼ mi., half of it on a 4 per cent grade, mixing for the entire running time of about 10 min.

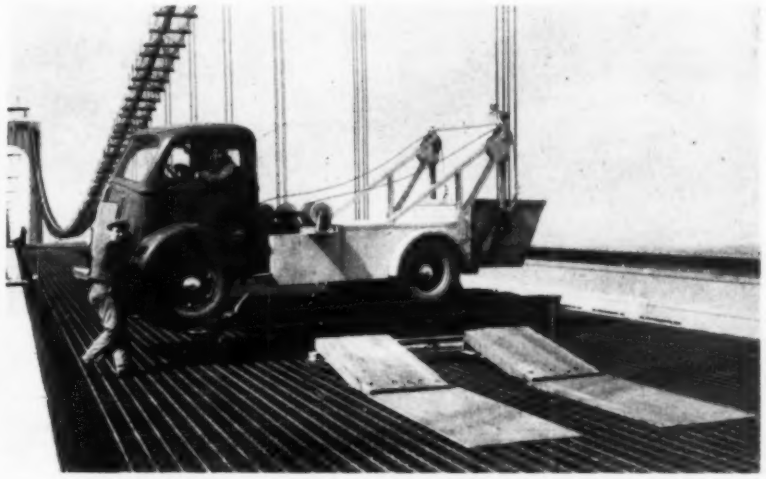
Considering the 20-ton weight of the loaded mixer trucks, there was some doubt that the floor reinforcing system could safely support the load, and concrete accordingly was transferred to light trucks for transporting on the grid. As ordinary dump trucks could not easily be filled from a mixer truck, the contractor adopted Speed-Dumpers for the work. Each unit consisted of a 1¾-yd. detachable one-piece bucket, handled on the rear of a light truck especially equipped with a gantry and a hoisting mechanism operated by power take-off from the transmission. Winches on either side operated cables which handled the bucket. An automatic tripping device inverted the bucket for quick, clean dumping. A second raising of the bucket placed it in a locked position on brackets for carrying. All dumping operations were controlled by the driver without leaving the cab. Usually three trucks were used with a total of six buckets. Empty buckets were set at the end of the suspended span, where the mixer trucks filled three of them from a 4-cu.yd. load. Each Speed-Dumper-equipped truck set down an empty bucket and shifted to a full bucket, which was quickly raised to carrying position.

In paving the first roadway, a track of ⅜-in. concrete-form-grade plywood was used as a runway over the steel grid reinforcement, but later the trucks ran directly on the steel without damage to the truck tires or the



BUCKET TRUCKS and special vibrating machine operating in contact with steel grid reinforcement expedite concrete paving of bridge deck.

TRUCK-MIXER delivers concrete to buckets picked up and transported by trucks equipped with special gantry rigs.



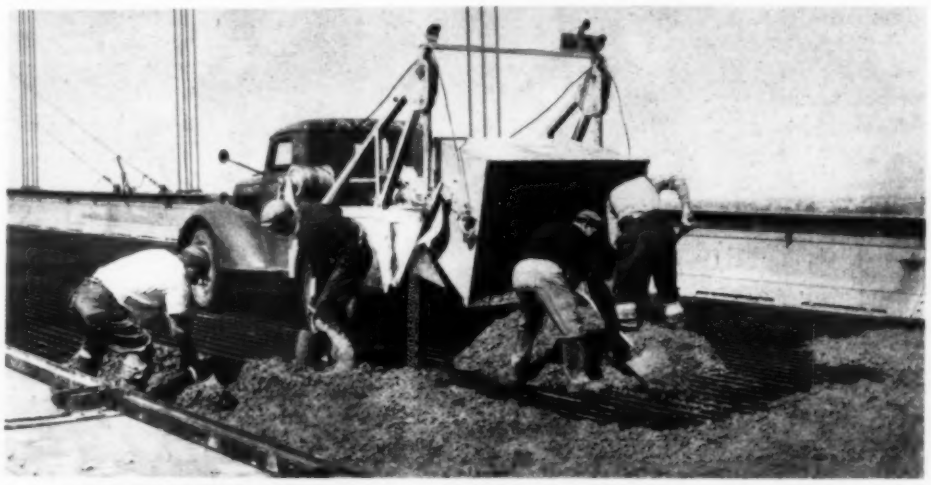
TURNTABLE on steel grid reinforcement turns truck transporting loaded bucket into delivery position.

grid. A movable turntable, operated by two men, reversed the trucks a short distance ahead of the work to permit backing to the point of placement.

Vibrating Machine—After dumped concrete had been spread, a special vibrating machine developed by the Flexible Road Joint Machine Co. vibrated the entire deck by agitating the steel grid reinforcement. The machine consisted of longitudinal steel runners suspended from a rolling gantry bridge carrying four 3,600 r.p.m. electric vibrators. To permit vertical adjustment of the vibrating unit to maintain contact with the steel, the chassis of the machine was supported by adjustable hangers from wheel trucks riding on the steel curb and center barrier of the bridge deck.

Power to operate the vibrators was obtained from a generator installed on a Flex-Plane gasoline-powered finishing machine working immediately behind it. The finishing machine, driven by a four-cylinder 24-hp. motor, pushed the vibrator unit and, at the same time, operated its own screed to make the first strike-off of the concrete. A power cable to operate the four 60-cycle 220-volt electric vibrators was plugged into an outlet socket on the finishing machine during this interval.

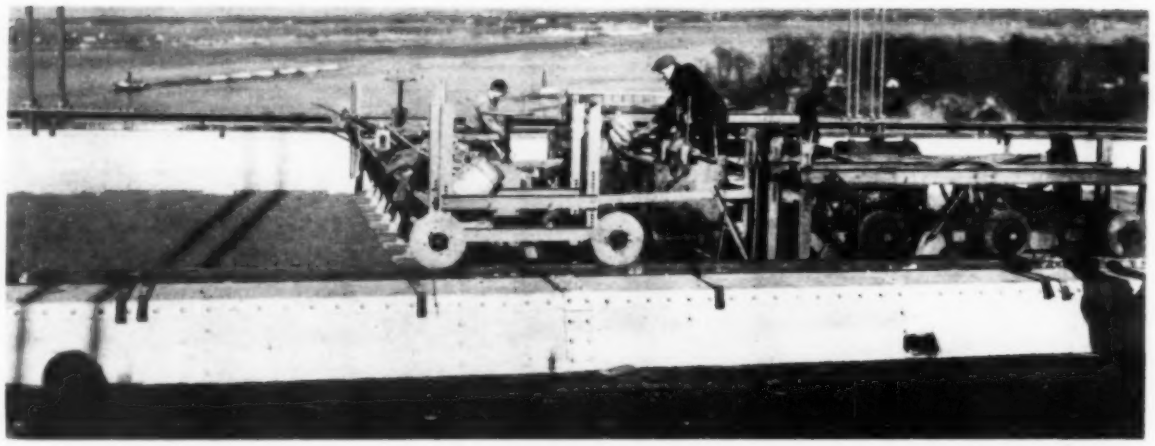
After moving the vibrator assem



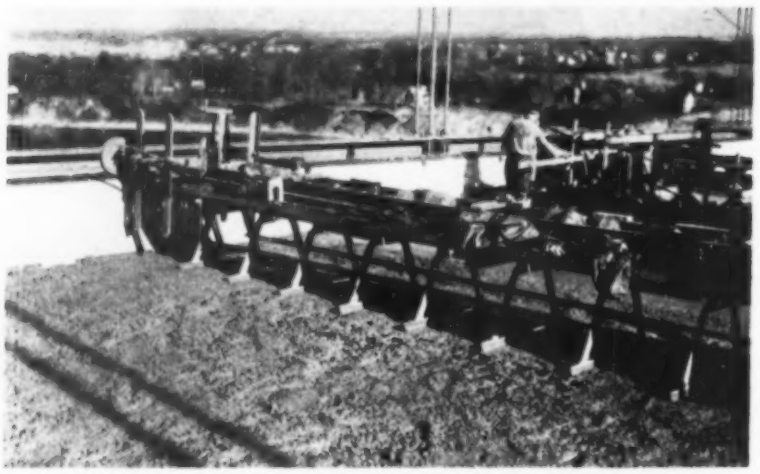
WITHOUT LEAVING CAB, truck driver controls operation of two winches which raise and lower bucket for quick dumping by automatic tripping device.

DECK CONCRETING is carried on under direction of (left to right) R. M. Chamberlin, superintendent, Corbetta Construction Co.; J. L. Bruschi, inspector, Madigan-Hyland; and Hal W. Hunt, engineer, Corbetta Construction Co.

bly ahead to the limit of the concrete, the finishing machine moved back to make a second pass over the deck and a third pass, if necessary. Behind the machine on its last pass, finishers floated the surface from bridges, sometimes working from the rear platform of the finishing machine, which moved slowly. All machines and bridges were equipped with narrow double-flanged wheels which rode on the upturned flanges of 4-in. I-beam rails. As a final operation, the surface of the concrete was broomed to give it a rough texture and was sprayed



SPECIAL VIBRATING MACHINE, operating with runners in contact with steel grid reinforcement, is pushed forward by gasoline finishing machine which also supplies electric power to vibrators on frame of forward unit.



STEEL RUNNERS in contact with reinforcing steel agitate entire deck when power is supplied to vibrators mounted on chassis of vibrating assembly.

with an asphalt emulsion for curing.

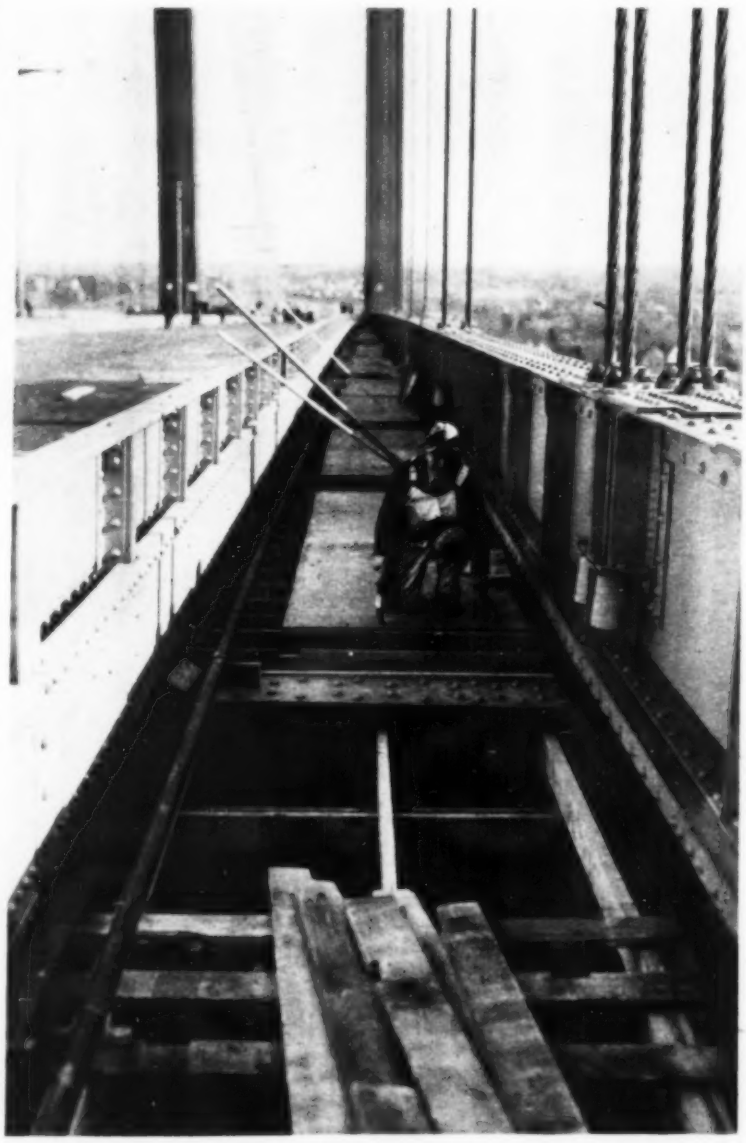
Steel Grid Reinforcement—I-Beam-Lok deck reinforcement, consisting of longitudinal 4¼-in. I-beams placed on 6-in. centers and connected by cross-struts at 6-in. intervals, came to the job in large, prefabricated, welded units, with bottom steel pans in place, for erection by the American Bridge Co., general contractor for the bridge superstructure. The prefabricated units were welded to floor joists on 5-ft. centers.

High-Early-Strength Concrete — A rapid construction schedule in early spring made high-early-strength concrete almost a necessity. Conditions were such that it was impractical to apply heat either to top or bottom of the slab concrete, and the steel-pan form offered little protection against freezing. Reasonably accurate forecast of weather could be obtained for only about 36 hr. in advance. In that period high-early-strength concrete would become safe from freezing, but ordinary concrete would not. As a further consideration, it was necessary to truck over the finished roadway to place sidewalks and do other work to complete the structure, and quick strength was necessary to expedite this hauling.

Roadway concrete contained seven bags of high-early-strength cement per cubic yard. Cylinder tests of concrete at the Port of New York Authority laboratory showed average compressive strengths of 6,500-6,600 lb. per square inch at 7 days and 7,000 lb. at 28 days.

Sidewalks — Sidewalks 5 ft. 8 in. wide and 3 in. thick, reinforced with expanded metal mesh, were placed on both sides of the suspended span, using plywood form panels which had served previously as the truck runway on the grid reinforcement. The supporting frame for the plywood rested on transverse timbers hung by threaded rods from tapped steel plates bearing on the edges of the angles which carry the sidewalk. Longitudinal stringers set on the suspended transverse timbers supported transverse joists, wedged tightly under the steel angles at both ends, on which the plywood was laid.

Administration — O. H. Ammann, director of engineering for the Port of New York Authority, is chief engineer of the Triborough Bridge Authority, in charge of design of the Bronx-Whitestone suspension bridge. Construction of the bridge is under the direction of Madigan-Hyland, consulting engineers for the Triborough Bridge Authority, who are in charge of design and construction



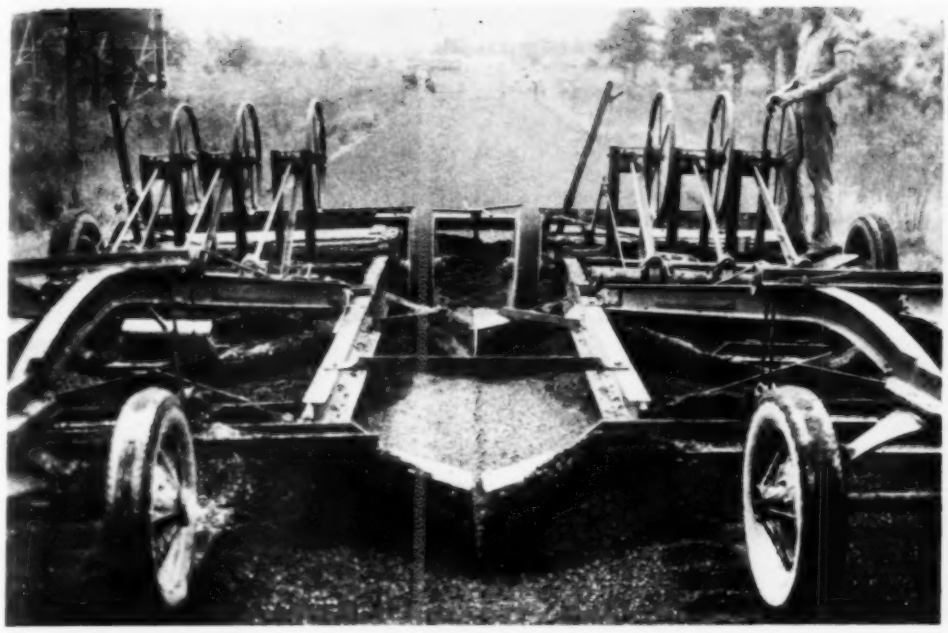
SIDEWALK FORMS rest on wooden frame supported by cross timbers hung by threaded rods from steel clips bearing on edge angles.

of all approach structures involved in the project. H. W. Hudson is construction engineer for the consultants, and H. W. Knox is resident engineer in charge at the site.

For the Corbetta Construction Co., New York City, subcontractor on deck paving and completion of the anchorages for the American Bridge Co., R. M. Chamberlain is superintendent, and Hal W. Hunt is engineer.

FULL-WIDTH RETREAD MACHINE

Improves Retreatment Work in South Carolina



MIXING AND FINISHING MACHINE for full-width retreatment work incorporates two road-mix units which may be detached for transportation between projects. Frames are lengthened to carry one more set of blades than conventional retread machines.

Photos from
W. K. BECKHAM
Maintenance Engineer, South Carolina Highway Department, Columbia, S. C.

A PAIR of extra-length retread machines developed by the Maintenance Division of the South Carolina Highway Department and connected side by side into a unit with a rear strikeoff spanning the full width of the roadway has improved retreatment work in the state by eliminating seams, turnarounds and rough spots. The unit moves in one direction and completes the mixing and finishing after a standard half-width retread machine has made a round and a half (one trip in each lane and a final trip down the center). A single crew operates the half-width and full-width machines in sequence and completes 2 to 3 mi. per day, with a maximum exceeding 4 mi., of 50-60-lb. treatment.

So successful has the full-width unit proved that the Maintenance Division now operates one in each of the four highway districts serving the 6,500-mi. state system. Each new machine embodies certain changes and improvements over previous models. In all units, each half of the assembly consists of a retread mixer about 8 ft. longer than a standard road-mix machine, with an additional set of V-blades installed at the rear in front of the strikeoff. At the throat of the V is a butterfly gate which the operator can adjust to feed additional material to either side as required. All diagonal blades are adjustable as to grade.

STANDARD RETREAD MACHINE mixes retreatment material in advance of full-width unit. Same crew operates both machines.

Behind the rear sets of diagonal blades on the assembly is a full-width rear strikeoff which may be adjusted for roadways 18 to 24 ft. wide. The strikeoff blade is made up of steel-plate segments to facilitate crown adjustment by means of a single screw at the center of the span. Rear wheels of the long assembly turn in unison to aid steering on curves. The two halves of the unit are detached for hauling between jobs.

Using the full-width machine the Maintenance Division finds road-mixing cheaper than plant-mixing for light retreatment work, 50 to 100 lb. Full-width retreatment is preferred, not only because it gives a better surface at less cost, but also because it eliminates hazards to workmen and traffic where an available detour permits closing a road. The speed of construction makes it necessary to close a 5-mi. project no more than 3 days, and local residents can use the road without damage during this interval. Even in mountainous regions, with no detours available, maintenance crews utilize the full-width machine and spread about 5 lb. of sand on the retreatment to let traffic use it. Turnouts usually can be found to pass traffic around the machine.

W. K. Beckham, maintenance engineer, South Carolina Highway Department, has been in charge of development of the full-width retread unit. In the field, Sam J. Mathis, assistant to the maintenance engineer, has aided the development by following the full-width retreatment work through several construction seasons.

REAR STRIKEOFF BLADE made up of steel-plate segments is adjusted to crown by screw at center of span. Machine requires 60-75-hp. tractor to pull it. Progress has here halted temporarily.

ROOF TRUSSES OF TIMBER (left) are prefabricated and stacked ready for removal by truck to site of house construction.

PRE-FABRICATION *Cuts Costs of Houses on Re*

PRE-CUTTING AND PREFABRICATION METHODS have been developed by the Farm Security Administration as a result of its experience in constructing approximately 11,800 low-cost homes and out buildings on 146 resettlement projects in 40 states.

The accompanying pictures illustrate building methods perfected in construction of 100 homes on the southeast Missouri project, near La Forge, Mo. A four-room house on that project cost a total of $929.50 and a five-room house cost $1,105.27 — an average of approximately $250 a room.

All the houses constructed in southeast Missouri are four or five-room structures, consisting of a kitchen, a living-dining room, and either two or three bedrooms. They also have an 8x8-ft. screened-in back porch. Four-room houses have an overall size of 24x24 ft.; and five-room houses are 24x36 ft.

Materials Used — Material used in construction is as follows: No. 2 framing lumber; No. 1 drop siding on 15-lb. felt paper; No. 1 perfection shingle on battens; double floor with No. 2 sub-floor, tongue-and-groove and No. 1 edge-grain fir finish-floor, tongue-and-groove. Building paper is used between the two floors and interior finish is vertical V-joint knotty pine boards. Ceilings are fiber board. The houses stand on short concrete piers with a tin apron on each post as a protection against termites. A variety of exterior designs have been used.

Houses on this project were built by Government-hired labor with Government-purchased material under the supervision of the Construction Division of the Farm Security Administration. The source of the labor was the U. S. Employment Service. Pre-cutting of material, and prefabrication methods simplified the work so that excellent use was made of unskilled labor.

While in the past most of the building has been done by the Government, this year all of the work is being done by private contract through the ordinary channels of construction trade. About 7,500 farmstead units (house and outbuildings) will be constructed this fiscal year. Constructors are making use of the low-cost methods worked out by the Farm Security Administration.

Prefabrication methods were worked out by a group of architects and engineers under Capt. R. B. Lord, Corps of Engineers, who was lent by the Army to FSA to take charge of the rural construction program. A cost limitation of $1,300 was placed on houses to be built in the South and $2,100 on houses built in the North.

It was realized that costs could not be kept within those limits if usual construction methods were used. The first cost-reducing practice employed was pre-cutting at a central shop where all material was cut to exact size by power saws, automatically eliminating wasteful trial and error methods.

After the material was cut, it was prefabricated by assembly into panels in the central shop. Prefabrication methods, it has been found, can be used successfully where 50 or more houses are being erected within a radius of about 25 mi.

In the prefabricating process, accurately measured templets were built and the pre-cut material was laid out on them. In the case of the panels for the sides of the house, the framing first was placed on the templets, and after it had been fastened together the siding was added. When these panels, approximately 8x8 ft. in size, were picked up, they formed a solid section absolutely true at all of its joints. They were given a base coat of paint with a pressure spray gun and stacked in the yard. The gable ends were assembled in a similar fashion. Light trusses were built in place of rafters. Floor framing was also pre-cut and assembled, as were window frames and door frames. Such equipment as a combination kitchen sink, drainboard, work table and cupboard was assembled at the mill, together with several types of kitchen cupboards.

When the sections of the house were completed, they were stacked in such a fashion as to allow a truck to

POURING CONCRETE FOUNDATION BLOCKS at prefabrication plant.

INSERTING STEEL STRIPS (below) in concrete foundation blocks. These strips anchor house framework to foundation.

WOOD PANELS FOR HOUSE WALLS (right) are prefabricated at central plant. Window and door openings are provided for in proper units. Prefabricated gables and finished side panels may be seen in background.

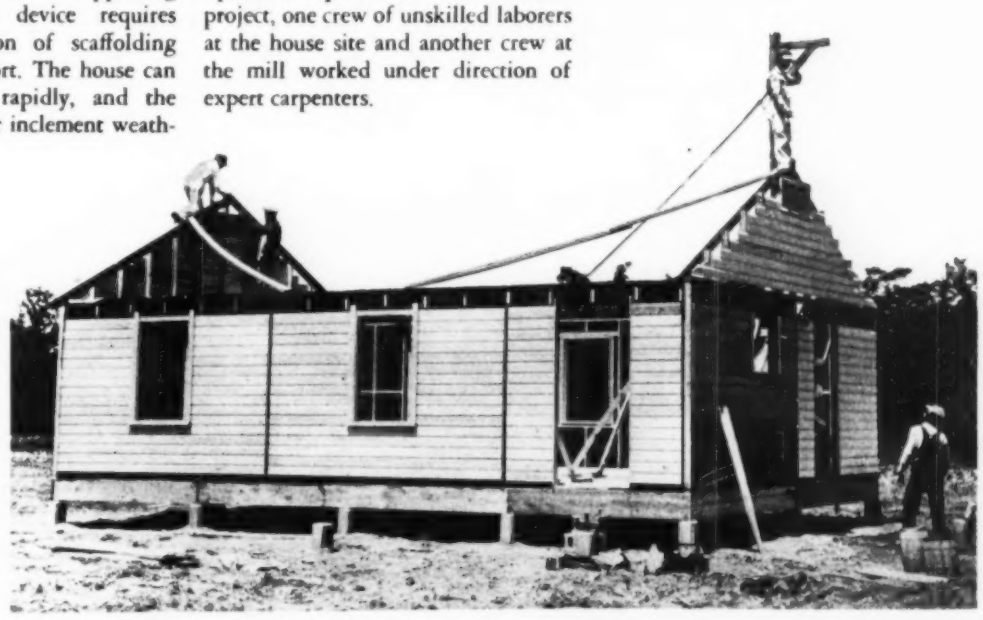
on Resettlement Projects of Farm Security Administration

drive slowly along and be loaded piece by piece with enough parts to form the major part of a house. The truck then was driven to the house site.

Here the floor framing and rough floor were placed on concrete foundation pillars, which had been precast at the mill. Then the sides of the house were erected and fastened together, with special care taken to seal the joints. Gable ends and the roof trusses came next, followed by the roof boards and shingles. The dwelling then was finished off inside, painted and doors, windows and rear porches screened.

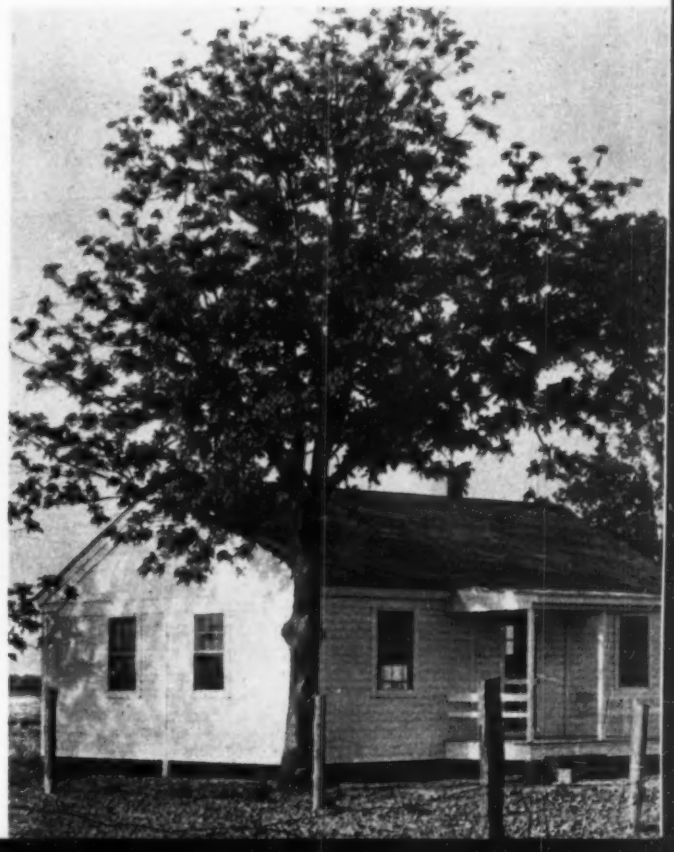
With the same basic panel structure, approximately six different designs are possible. Changing the exteriors through the use of different material makes for even greater variety.

One example of the savings made in design is found in the supporting roof truss. This device requires neither the erection of scaffolding nor partition support. The house can thus be inclosed rapidly, and the inside work left for inclement weather. Consequently, a balanced labor operation is possible. On the Missouri project, one crew of unskilled laborers at the house site and another crew at the mill worked under direction of expert carpenters.



ALL PREFABRICATED PANELS AND GABLES (right) for this house have been set in place by unskilled labor. Interior walls are finished with inexpensive but attractive pine panelling.

INTERIOR OF RESETTLEMENT HOUSE shows pine paneling and furnishings.



RURAL HOUSES (right) are one-story structures of from four to five rooms.

Experimental Grading Project

TESTS THREE TYPES OF COMPACTING EQUIPMENT

By W. S. DUN

Assistant Engineer,
State Department of Highways, Columbus, Ohio

NINE EXPERIMENTAL EMBANKMENTS are constructed with material removed from cuts. Soil consists predominantly of brown silty clay.

SCRAPER AND BULLDOZER spread loose material to required thickness for full length and breadth of embankment.

INCREASING emphasis on stability of earth embankments in highway construction poses a future problem for engineers and contractors. During 1938 the U. S. Bureau of Public Roads cooperated with several state highway departments in setting up experimental projects to study the procedure and economic justification for building embankments of maximum, or near-maximum, density. The experiments are important to road builders because they may presage closer control of fill compaction in the future, with consequent emergence of the dump as the factor governing production on grading jobs. Ohio's experimental project, discussed in the accompanying article, is typical of those undertaken last year. Although the report is preliminary, it indicates the purpose of the experiments and the means being taken to determine methods, costs and economic value of controlled compaction on fills.

MODERN HIGHWAY TRAFFIC requires the construction of highways with minimum grades and maximum sight distances, frequently involving heavy grading operations. To govern the procedure for building fills, the Ohio Department of Highways, under the guidance of the U. S. Bureau of Public Roads, in 1935 adopted a specification for the control of moisture and compaction of earth embankments. During the next three years the problem received considerable attention, with the result that the specification was revised in 1938. It was apparent, however, that additional and more accurate information was needed concerning the performance of various types of compacting equipment, economics of moisture control, depth of layers which can be most efficiently compacted, and the differential settlement obtained in the foundation and in the embankment itself.

Experimental Project

To obtain such information, the Ohio Department of Highways and the Bureau of Public Roads set up a cooperative experimental project on which a study could be made of these questions. The project, 3.52 mi. long, was located 1 mi. north of the City of Delaware on Route U.S. 23. It was an ideal selection for a test section, because the old road was hilly, requiring several fairly large fills for the new grade; the area is relatively stable, indicating little future settlement in the foundation; and the site is close to the headquarters of both the Highway Department and the Bureau of Public Roads in Columbus.

Information recorded in these notes is of a preliminary nature, based on observations made during construction and not yet confirmed by tabulation of the technical investigations and engineering data obtained. Many hundreds of readings, measurements, levels, operating times, costs and tests were recorded, and these data should yield valuable information when summarized and studied.

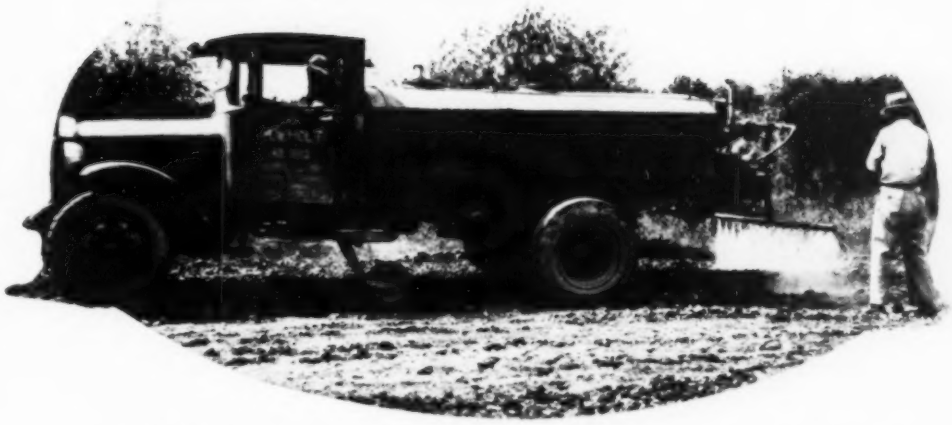
Nine Fill Sections

Observations noted here apply only to the conditions and type of soil used for embankment on this project, which consisted predominantly of a brown silty-clay of glacial origin of Bureau of Public Roads A-4 classification, and may not necessarily be true for projects in

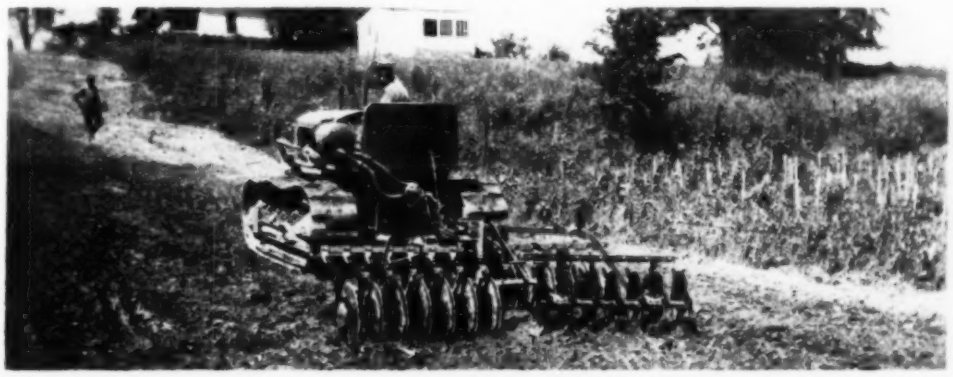
other localities having entirely different soil conditions. Nine experimental sections of fill were constructed under special provisions for placement, control of moisture content and compaction of the soil, as listed in an accompanying table.

Embankment material was spread to the required loose thickness for the entire length and width of the embankment with scraper and bulldozer. Moisture content of the material was determined (by test methods described in "Soil Mechanics Applied to Highway Engineering in Ohio," Bulletin No. 99 of the Engineering Experiment Station, Ohio State University, Columbus, Ohio) and, if less than optimum, the soil was sprinkled with water by means of a self-propelled, dual-tired distributor. The distributor was equipped with a power pump capable of applying water at the rate of from 0.05 gal. per square yard to 1.5 gal. per square yard, adjustable spray bars, pressure gages and tachometer. If the moisture content was greater than optimum, the soil was disked until the excess water was evaporated, or drier material was added. In this manner the moisture content was held reasonably close to the optimum.

After a layer of soil had been moistened, or dried, it was thoroughly disked to break up all clods and to distribute the water as uniformly as possible through the entire layer. The final operation was the rolling to the desired compaction, the compaction for each completed layer being determined by a density test (described in Bulletin No. 99, previously mentioned)



WHERE MOISTURE CONTENT is less than optimum, distributor truck equipped with power pump, pressure gages, adjustable spray bars and tachometer applies controlled quantity of water.

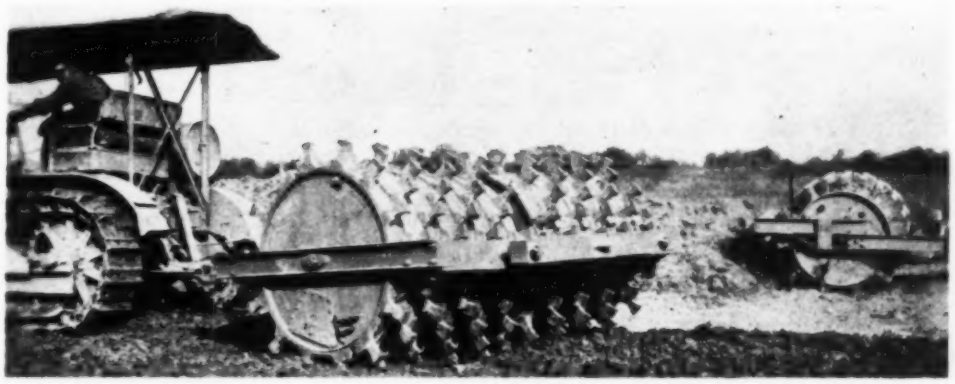


AFTER MOISTURE has been adjusted close to optimum by adding water (or by drying soil containing excess moisture) disk harrows break up clods and distribute water uniformly through entire layer.

Sheepsfoot Roller

Sections 1, 4, 6 and 8 were compacted by a sheepsfoot tamping roller of the twin-cylinder type, consisting of a frame and tongue which can be attached to a tractor in such a way that the entire device may be either pulled or pushed in operation. The frames for the two rollers are pivoted to the main frame in a manner which permits the rollers to adapt themselves to uneven ground surfaces and to rotate independently of each other. The roller was of the following dimensions: length of each cylinder, 4 ft.; outside diameter of cylinder, 40 in.; space between cylinders, 12 in.; length of tamping feet, 6 in.; bearing area each foot. 5¼ sq.in. Weight of the roller, with both cylinders filled, was 6 tons.

Although compaction results for the tamping roller have not yet been correlated with the number of passes of the roller, it was observed that the performance of the unit was more satisfactory when operating on soil which had the water distributed uniformly through it than on soil where the water was less thoroughly mixed. More satisfactory results were obtained on soil which



TWIN SHEEPSFOOT ROLLERS compact soil layers on four experimental fill sections.

THREE EMBANKMENTS (left) are compacted in successive layers by 10-ton three-wheel flat roller.

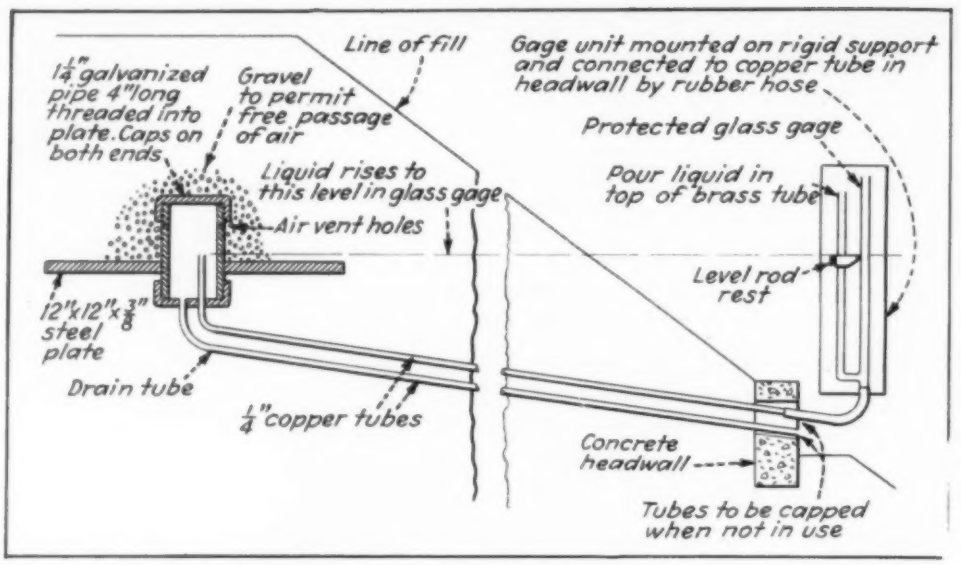
PNEUMATIC-TIRE ROLLER weighted to 6 tons with sand bags makes large number of passes to obtain desired compaction of soil layers on two embankments.

was compacted at the optimum moisture content or slightly higher moisture contents than where it was drier.

Although the roller lacked desirable maneuverability when operating in confined areas or near structures, it was quite satisfactory for obtaining compaction on the extreme outer edges of fills. The tamping feet of the roller left the surface of the embankment in an uneven condition, providing good bond between successive lifts, but rain on this uneven surface caused pocketing of water with subsequent softening of the embankment.

Three-Wheel Roller

Sections 2, 5 and 9 were compacted by a standard three-wheel, 10-ton, general-purpose roller. This roller gave satisfactory compaction on soil which was placed at the optimum moisture content or at moisture contents somewhat less, but slipping and sliding of the roller occurred when it was used on soil wetter than the optimum. The roller had fairly good maneuverability when operating in confined areas or near structures. It left the embankment surface in a smooth, hard condition which proved to be a good protection to the grade during rains but necessitated disking each compacted layer to furnish adequate bond between successive lifts.


Line of fill
Gage unit mounted on rigid support and connected to copper tube in headwall by rubber hose
¼" galvanized pipe 4" long threaded into plate. Caps on both ends
Gravel to permit free passage of air
Protected glass gage
Pour liquid in top of brass tube
Liquid rises to this level in glass gage
Air vent holes
Level rod rest
12"x12"x⅜" steel plate
Drain tube
¼" copper tubes
Concrete headwall
Tubes to be capped when not in use

DETAILS of Ames settlement cell used for measuring fill settlement.

SETTLEMENT CELLS to measure future subsidence of embankments are installed in fills by U. S. Bureau of Public Roads. Two copper tubes run from cell to outlet in side slope of embankment. Elevation of cell is accurately determined from bench marks.

Pneumatic-Tire Roller

Sections 3 and 7 were compacted by a pneumatic-tire roller. Four tires were mounted on the front axle and five on the rear axle, spaced so that the front and rear tires were staggered to cover the entire area over which the roller traveled. The wires were 5x20 in. and carried 28-lb. pressure. The roller, with the hopper filled with sand, weighed 6 tons.

Satisfactory compaction was obtained on soil which was placed at the optimum moisture content or slightly higher, but was somewhat difficult to obtain where the moisture content was less than the optimum. It was observed that a considerable number of passes were necessary to obtain the specified compaction. This roller lacked desirable maneuverability when operating in confined areas or near structures, but was capable of comparatively rapid movement on larger embankment areas. The slightly corrugated surface left by the roller apparently furnished satisfactory bond between successive lifts.

Administration

Settlement cells, installed before the embankment was started, were placed under each of the nine test sections under the supervision of Edward Willis and Earl Green, of the Division of Tests, U. S. Bureau of Public Roads, Washington, D. C., of which C. A. Hogentogler is departmental head. Readings were taken at intervals during the entire period of construction and will be taken for the next several years. Equipment operating time and cost analyses were compiled by J. L. Harrison of the Bureau of Public Roads, Walter S. Lytz being the representative in the field. All Federal activities were under the supervision of W. V. Buck, senior highway engineer of the Columbus office, and George Geohl, associate highway engineer.

The project was set up and the various experimental sections determined by the Bureau of Location and Design, of the State Highway Department, of which Karl L. Rothermund is chief engineer. Construction activities were under the supervision of the Bureau of Construction, Elmer Hilty, chief engineer, and Frank W. Turner, division engineer. Thomas L. Gilliland was project engineer. Engineers from the State Highway Testing Laboratory were assigned to the project and made the various tests on all experimental sections.

Stellhorn and Beightler, Columbus, Ohio, were the contractors. Unqualified cooperation of all the men interested in the project was largely responsible for the success of the experiments.

AFTER INSTALLING SETTLEMENT CELL, engineers carefully cover cell and tubes with sand before next layer of fill is placed and compacted.

TO DETERMINE subsequent elevation of cell buried in fill, one copper tube is connected by hose to gage unit at outlet, and system is filled with water.

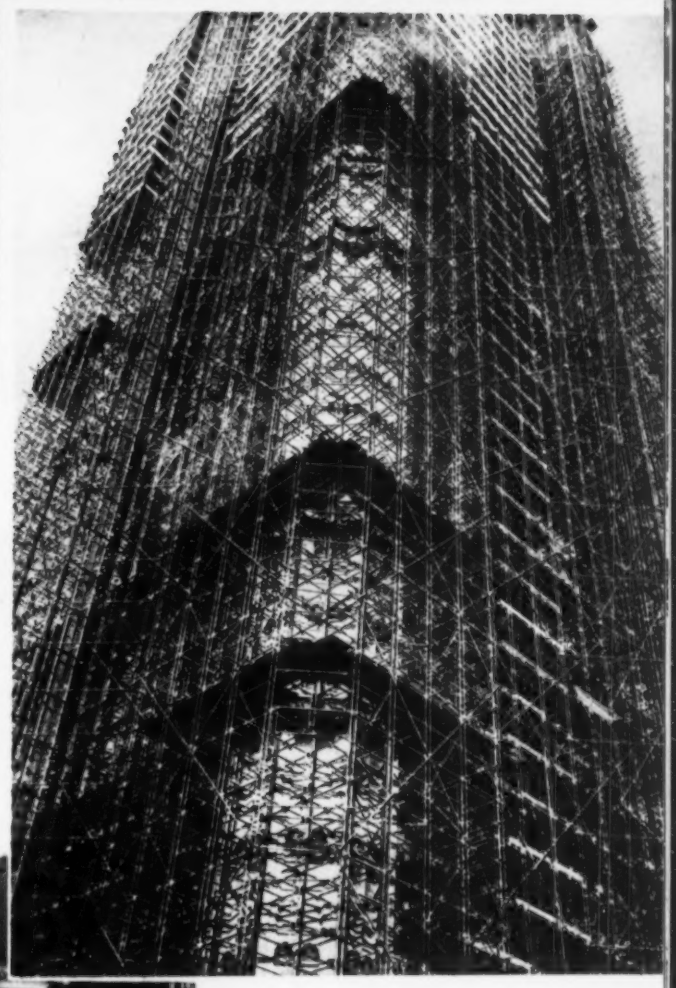
EXPERIMENTAL EMBANKMENT SECTIONS

Section No.	Compacting equipment	Layer thickness, in.	Compaction requirement, per cent
1	Sheepsfoot tamping roller	6	100
2	Three-wheel roller	6	100
3	Pneumatic-tire roller	6	100
4	Sheepsfoot tamping roller	6	100
5	Three-wheel roller	9	100
6	Sheepsfoot tamping roller	9	100
7	Pneumatic-tire roller	9	100
8	Sheepsfoot tamping roller	6	95
9	Three-wheel roller	6	95

JOB ODDITIES

A MONTHLY PAGE OF

Unusual Features of Construction



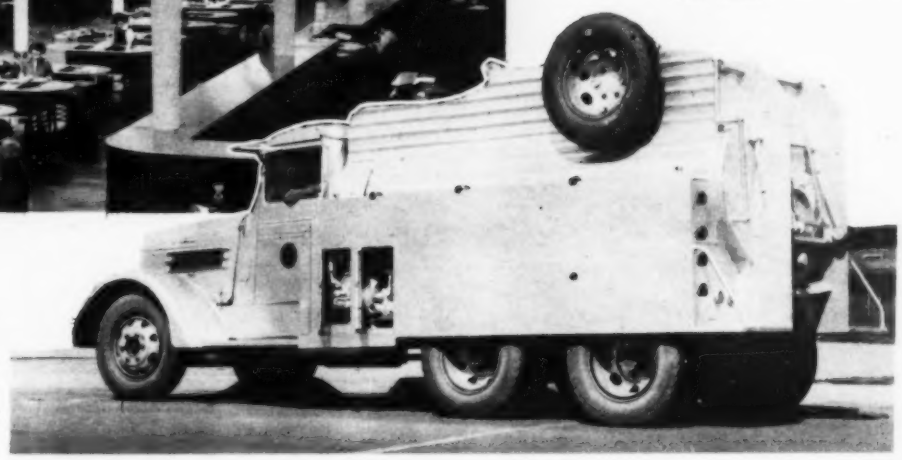
SWATHED IN TUBULAR SCAFFOLDING (right) the Victoria Tower of London's Houses of Parliament is undergoing extensive repairs. Staging forms such a dense network that exterior walls of historic structure are scarcely visible.

GRAPHIC TRAFFIC CHECK. With aid of 108 detectors placed at 50-ft. intervals in traffic lanes of half-mile section of nearby highway and connected by cables to pens marking strip-charts of time recorder, U. S. Bureau of Public Roads obtains valuable data on passing practices of motor vehicles.

STRAIGHTENING NAILS, (left) so that carpenters can drive them again, is the chore that these two Greek youngsters are performing on construction of a modern concrete building in mercantile center of Athens. In most respects job was typical of American methods except for absence of deformed steel reinforcing bars and use of hooks on column reinforcing. — Photo from PAYSON C. FRANCIS, assistant superintendent, Turner Construction Co., New York.

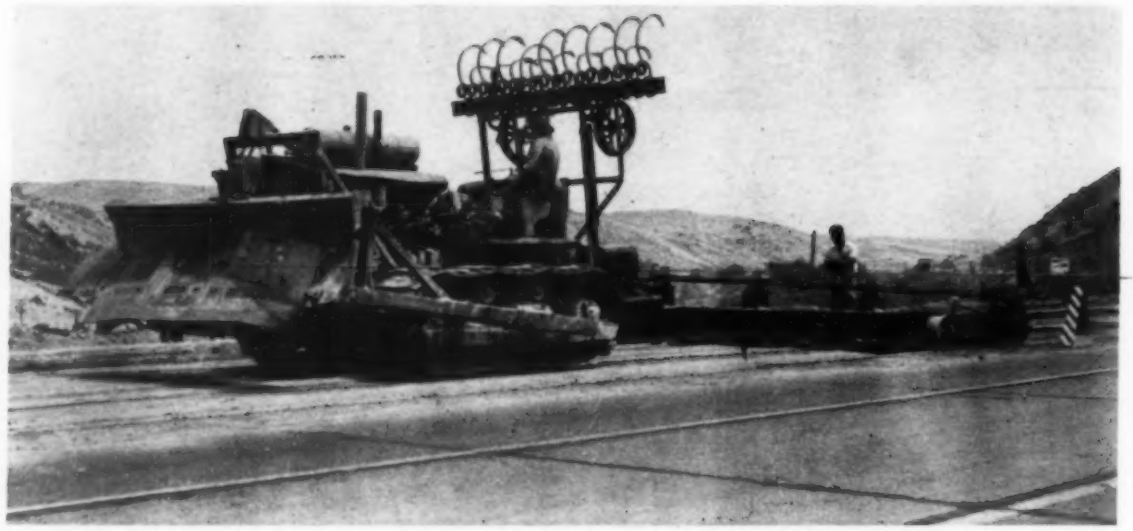
"GOLF TEE" COLUMNS OF CONCRETE. with hollow, tapering stems, are one of unique design features of new office building at Racine, Wis., designed by Frank Lloyd Wright for C. S. Johnson Co., maker of floor wax, and described in the May issue of this journal. Columns in 130x210-ft. main room of structure are 21 ft. 7½ in. high and 9 in. in diameter at their bases. Circular "petals" at tops of stems are 18 ft. 6 in. in diameter. Concrete of high-early-strength cement was delivered to all parts of job by pump and pipe line and consolidated by internal vibration. Contractor on cost-plus-project was B. E. Wiltscheck, of Racine.

TO GET FISH OVER DAM. (below) Here is one of a fleet of eight specially constructed trucks which the U. S. Bureau of Reclamation has purchased to carry the 1939 run of salmon from the Columbia River to tributary streams above Grand Coulee dam which now blocks their passage. The truck carries a 1,000-gal. tank with an ice compartment for cooling the water and a pump which circulates air to replenish the oxygen absorbed by the fish from the water. Aluminum paint on tank body reflects heat. Loaded truck weighs 6 tons and can travel 50 mi. per hour.



Contractor's Equipment "Kinks"

Save Five Months' Time on Road Widening Job



OUTRIGGER CUTTING TEMPLET riding on side forms and hauled by tractor-bulldozer unit shapes subgrade widths of from 10 to 20 ft.

"CURRY-COMB SLOPER" for weathered cuts consists of heavy spike-tooth harrow hung from 70-ft. boom of crawler crane.

David H. Ryan, Contractor Developed These Equipment "Kinks"

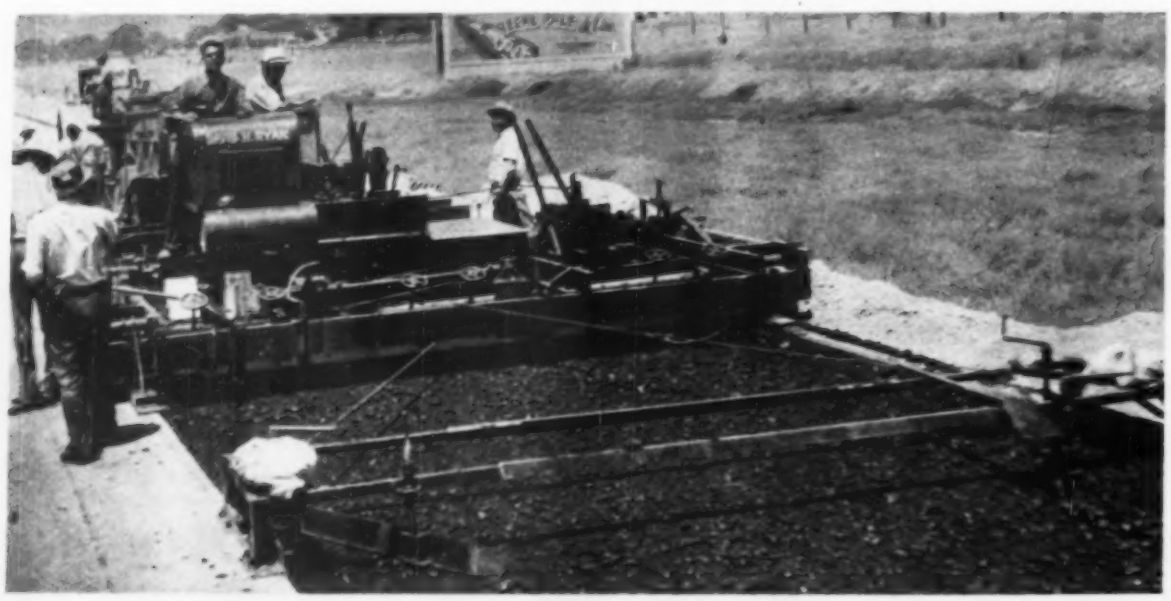
1. **Drop hammer on truck crane for compacting fill.**
2. **"Curry-comb" slope grader.**
3. **Outrigger templet on bulldozer for rounding slopes.**
4. **Sectional steel curb forms with interlocking devices.**
5. **Mechanical asphalt raker.**
6. **Cutting templet for shaping subgrade.**
7. **Traveling mixer with dragging platform for curb concrete.**

ON THE $380,000 CONTRACT for widening and modernizing the Rose Canyon highway leading to San Diego, Calif., new developments in equipment and methods enabled David H. Ryan, contractor, to complete the job five months ahead of schedule. The project, carried out under the supervision of California's Division of Highways, involved widening from a three-lane to a four-lane route 9 mi. of asphaltic concrete pavement to handle a rapidly increasing volume of traffic.

In order to assure adequate support for the new pavement on the widened sections placed over old fill areas, it was necessary to recompact the old embankments. This was done by shifting the material and rebuilding the fills in thin lifts with adequate compaction. Where sections of the old pavement had settled, the existing pavement was removed and unsuitable material taken out to a depth of 2 ft.

In order to recompact the fill below this point, considerable experimenting was done with a drop-hammer operated from a truck-crane. As reported by Earl E. Sorenson, district construction engineer, this method produced compaction of 88 per cent to a depth of from 4 to 5 ft., assuring the necessary support for the new pavement.

The widening job required the resloping of many old cuts which had washed and weathered to an un-



ASPHALTIC CONCRETE PAVING MIX (left) is spread and raked by this mechanical unit.

FILLS ARE COMPACTED by drop-hammer operated by truck-crane.

SLOPE-ROUNDING ATTACHMENT is rigged on blade of bulldozer.

sightly appearance and which were high enough to present a serious problem. To correct this condition Contractor Ryan developed a method of sloping using a device similar to a spike-tooth harrow, but much heavier. This device, called a "curry-comb sloper," was suspended by cable from the 75-ft. boom of a crawler crane and was hauled back and forth on the face of the cut and over the rounded tops of the slopes, as illustrated herewith.

Another device developed by the contractor was an outrigger cutting templet rigged on a standard bulldozer unit and used to round slopes on the smaller cuts.

For preparing the asphaltic concrete mix for the paved surface of the widened highway the mixing plant was equipped with automatic scales and electrically controlled air valves and pistons for operating the gates on the aggregate bins. In applying the mix on the subgrade the latest improvements in spreading devices and raking machines were employed. Mr. Sorenson reports that a three-axle roller was used with excellent results on the "breakdown" immediately behind the raking machine.

SECTIONAL STEEL FORMS for dividing curbs have interlocking devices and braces permitting removal and resetting of 200 ft. per hour of double curb dividing strip.

Due to the small amount of concrete per linear foot used in the dividing curbs, which were doweled to the existing pavement, it was necessary to move and reset the curb forms very rapidly in order to avoid any delay to the equipment. To provide for this the contractor designed and constructed an ingenious set of steel forms, in sections, with interlocking devices and bracing which permitted him to remove and reset up to 200 ft. of double curb per hour.

For mixing concrete, a 1-cu.yd. traveling paver was used, dragging platforms from which the mixed concrete was shoveled into the forms and also mounting or towing the driving units for both electric and air vibrators.

A Caterpillar tractor mounting a bulldozer, to which was welded a properly shaped cutting templet, which rode the side forms, also was developed to cut and shape all widths of subgrade from 10 to 20 ft.

Money in a Vacuum

VACUUM PROCESSING of soupy concrete poured in steel forms for reinforced precast conduit covers at Connecticut College, Storrs, Conn., enabled C. W. Blakeslee & Sons, contractors, New Haven, Conn., to remove excess water from the fluid mixture and obtain dense concrete developing 4,000-lb. compressive strength in 7 days. Specified as an alternate with various types of tile, the precast concrete covers were low on a bid of $2.62 per linear foot. Because of the curved shape, thin wall section and steel reinforcement of the conduit covers, it was impossible to fill the forms except by the use of 1:3 mixture of the consistency of soup. If the mixture had been allowed to set within the forms in the ordinary manner, the concrete would have been altogether unsatisfactory because of porosity and lack of strength. Success in casting the covers with equipment rented from the Vacuum Concrete Corp., New York City, prompted W. T. Gilbert, of C. W. Blakeslee & Sons, to suggest an anomoly — that there is money in a vacuum, instead of the dictionary definition. In his opinion, the vacuum process made casting possible.

BIGGEST FUEL STORY OF THE YEAR

70 octane

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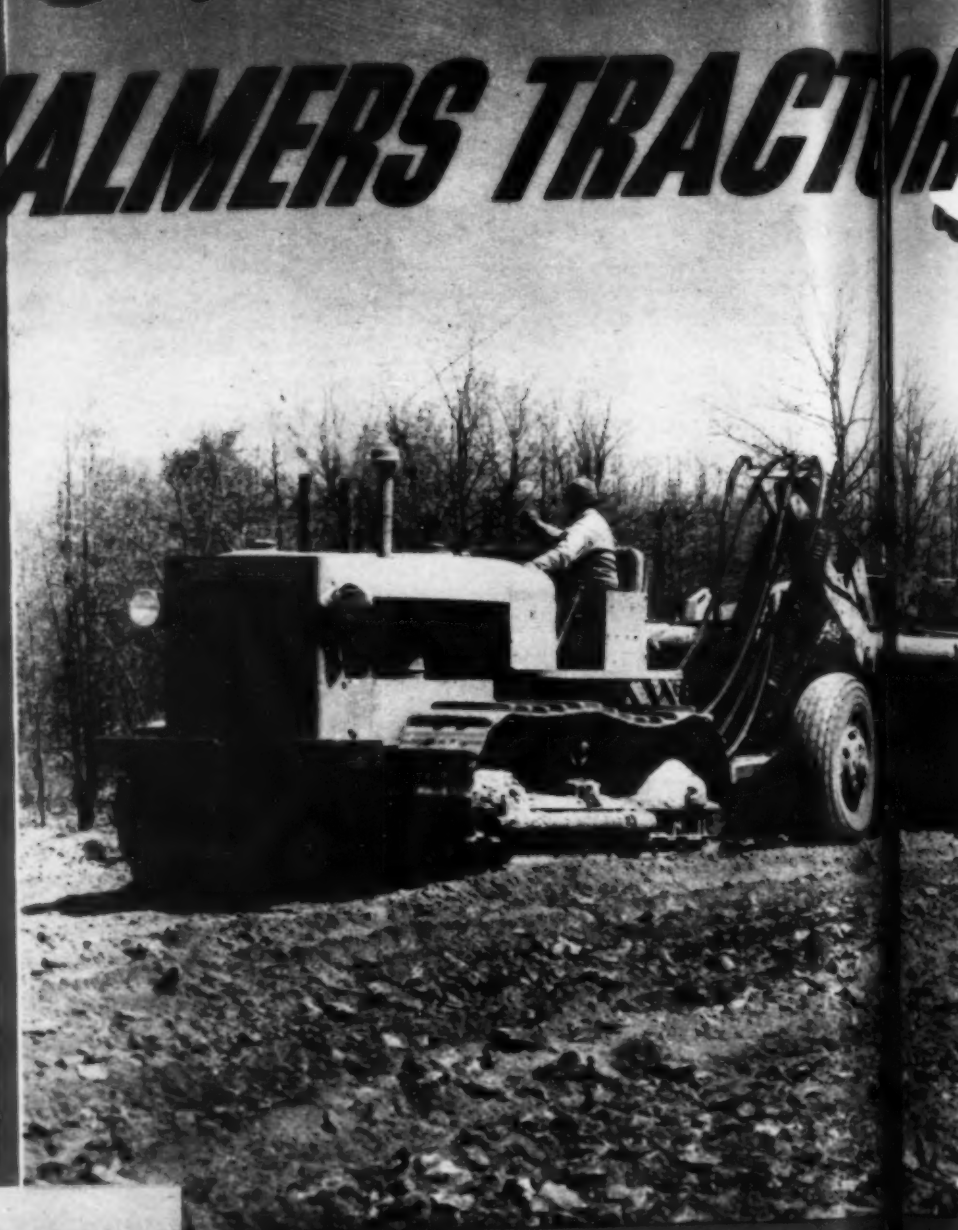
Now you can take full advantage of the quick-firing, dynamic power of 67-70 octane gasoline. It's the same high-compression, anti-knock fuel you use in your trucks and autos. Available everywhere without premium. In the NEW Allis-Chalmers tractor engines this clean-burning, powerful fuel provides 5 to 9% more power than ordinary gas or Diesel oil . . . cuts gas consumption as much as a gallon an hour. What's more, the price of a gas "L" is $1000 to $1800* less than Diesel tractors of comparable horsepower! That saving alone is enough to buy fuel for a year's operation. In addition, lower first cost assures you lower interest, lower taxes, lower depreciation — savings that cut costs on every yard you move.

Ask your Allis-Chalmers dealer to demonstrate on your job. See for yourself what the ***FASTER POWER*** of Allis-Chalmers tractors burning 67-70 octane gasoline can do for you.

* Saving on 70 octane gasoline "S" tractor is $800.



70 Octane Fleet — M. E. Gillioz was quick to see the advantages of operating with the NEW Allis-Chalmers 70 octane gasoline engines, bought 15 Model "L" tractors and 8 Gar Wood scrapers for use this spring on jobs in Oklahoma and Mississippi. Here three of them with Gar Wood scrapers are making a fill on Gillioz' Grand River Dam contract in Oklahoma.

Boosting Yardage — Gillioz, like many other contractors, uses A-C Pusher tractors, thus cuts scraper loading time ½ to ⅓ while adding 2 to 3 pay yards to the load. Repair bills and time losses are reduced, too, because the pusher relieves the hauling tractor of the severe jerking and twisting strains of loading. Round trip time is cut by the higher travel speeds of A-C tractors — up to 6.41 m. p. h. or 564 feet per minute (nearly 100 feet faster than any other big tractor).

...ON-PREMIUM gasoline

...TORS

... INCREASES POWER 5 TO 9% .. CUTS GAS CONSUMPTION AS MUCH AS A GALLON AN HOUR .. ENABLES YOU TO SAVE $1,000 TO $1,800 PER TRACTOR ON INITIAL COST ALONE!

No longer need you be limited to one fuel. With Allis-Chalmers you can select a tractor to use whatever fuel is best in your locality . . . gasoline, Diesel oil or butane . . . get a full, even flow of power from any one of the three.

ALLIS-CHALMERS POWER

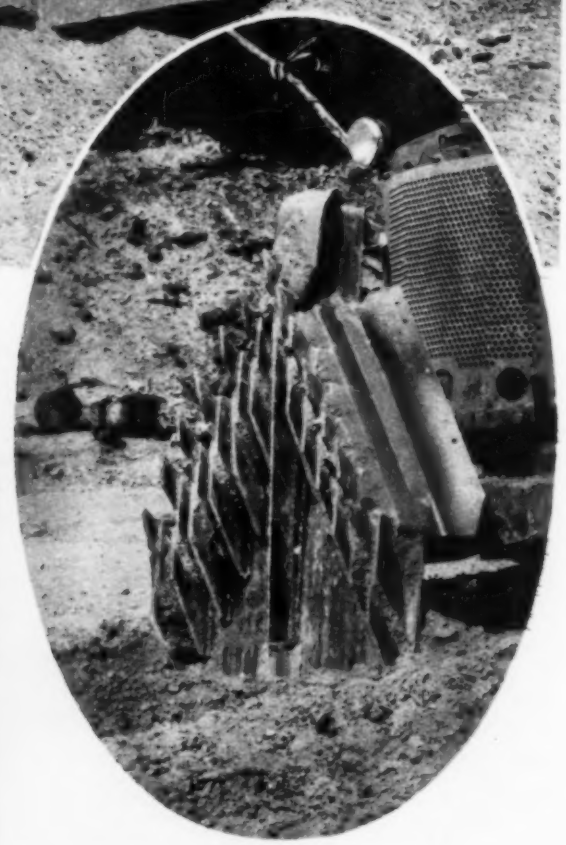
TRACTOR DIVISION—MILWAUKEE, U.S.A.

TRACTORS, ENGINES, ROAD MACHINERY

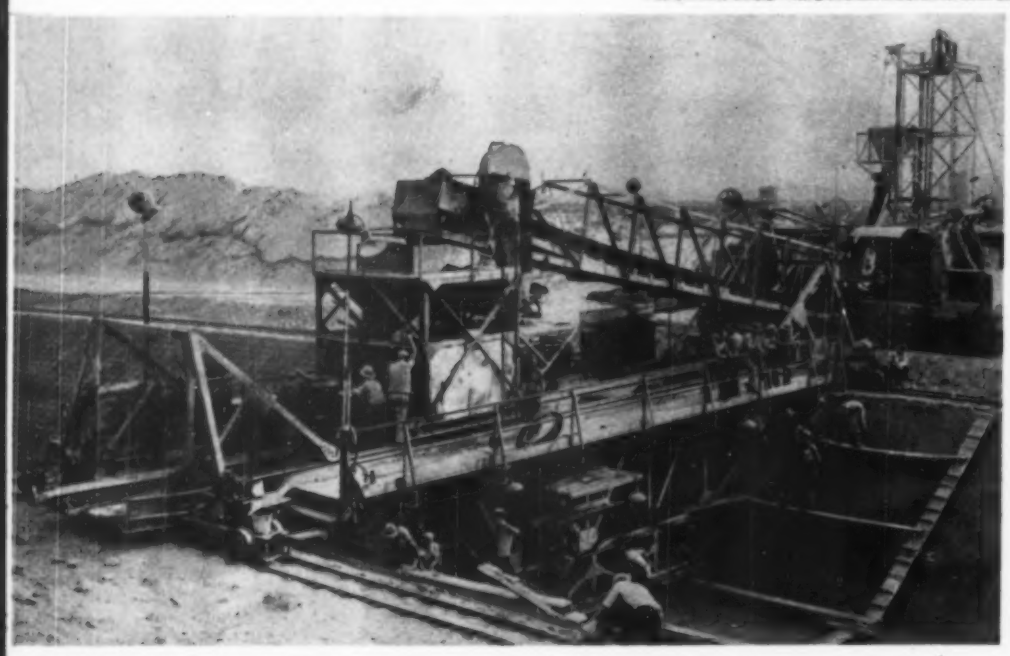
.. IT DOESN'T COST .. *it Pays!*

How They Did It

CONSTRUCTION DETAILS *For Superintendents and Foremen*



LIME ROCK PLOW, (above) developed by Troup Bros., contractors, of Miami, Fla., replaces explosives as a means of preparing subgrade for road between Lumpkin and Cuthbert, Ga. Plow equipped with battery of scarifying teeth **(inset)**, is attached to frame of standard LaPlant-Choate hydraulic trail-builder, mounted on a 95-hp. Caterpillar tractor. Change from plow to bulldozer blade can be made in 3 min.



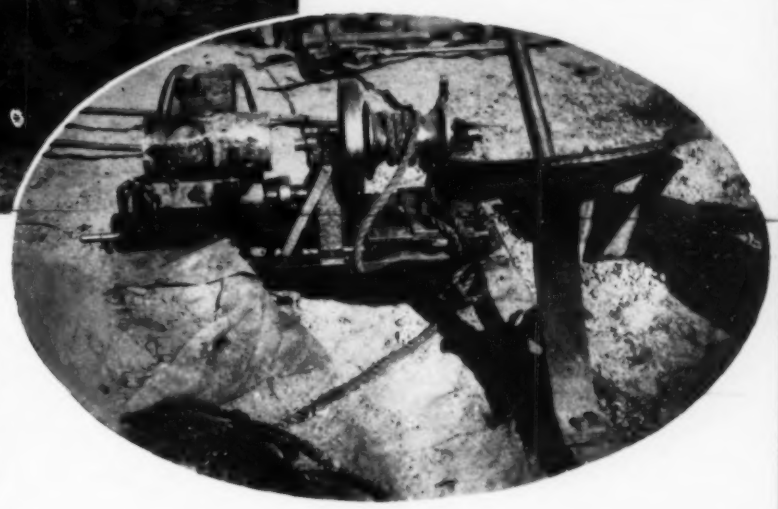
CONCRETE LINING for the 62 mi. of open canal included in the 242-mi. long Colorado River aqueduct in California involved the use of highly mechanized equipment, developed expressly for this project of the Metropolitan Water District. Lined canal in earth has finished bottom width of 20 ft., top width of 55.13 ft. and depth of 11.71 ft. Thickness of lining is 6 to 8 in. Pioneered by Wood & Bevanda, type of paving machine adopted by all contractors was essentially a giant trowel formed of steel plates fastened to a heavy traveling steel framework shaped exactly to dimensions of finished canal cross-section. A pair of concrete mixers fed by batch trucks kept pace with machine on roadway alongside canal. Concrete for far slope of lining was delivered to a distributing hopper by a belt conveyor.

MOBILE SERVICE STATION attends to lubrication needs of big fleet of heavy-duty motor trucks, draglines, tractors and other equipment operated by Guy F. Atkinson Co., contractor, on Hansen dam in San Fernando Valley, California. A 2-cylinder Covic diesel engine, mounted behind driver's seat on truck carrying lubricants, operates air compressor for tires and grease guns and generator for flood-lights on night work. Service truck operates 24 hr. a day, requiring nine operators who work in three shifts.

INSULATION FOR STEAM MAIN of New York Steam Co. is provided by surrounding line with jacket of hollow tile ducts which are filled with crumpled newspapers before ends are sealed with cement mortar, thus creating dead air spaces to minimize heat losses.

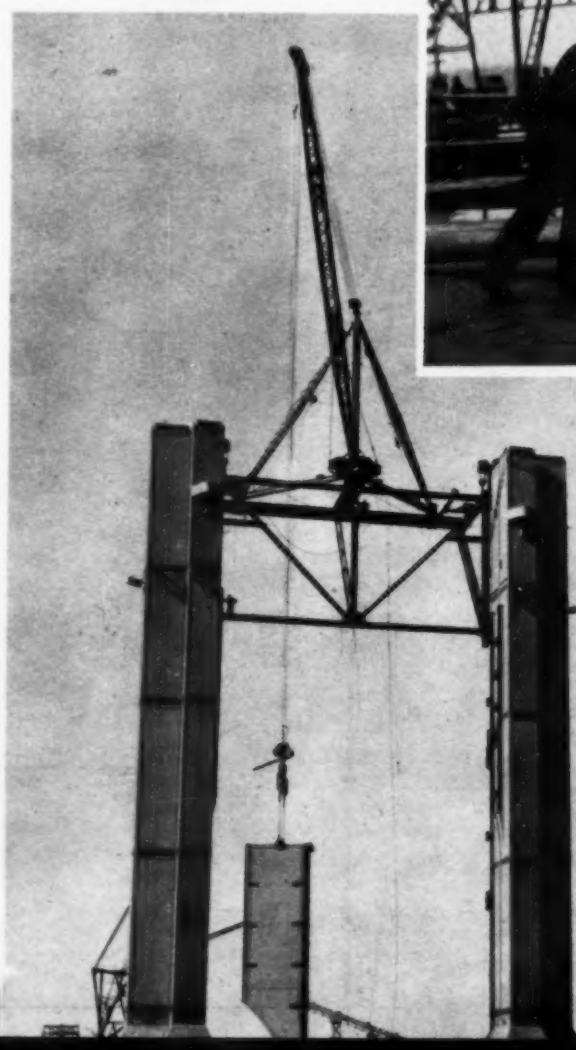
FOR LAND CLEARING OPERATIONS near Ferndale, Wash., Schriner & Johnson, contractors, have equipped their Allis-Chalmers tractor with a special Isaacson bulldozer blade equipped with teeth for hooking under tree roots, stumps and rocks. This outfit clears about 1½ acres per day.

COMFORT FOR OPERATOR (below) of churn drill used by bridge division of Missouri Highway Department is provided by equipping rig with spring seat from old hay-rake. Avoids necessity of standing while snubbing rope, hour after hour, on winch drum.



HOME-MADE CARRIER (below) proves useful in handling pipe and other materials used by Turner Construction Co. in building new 694 x 340-ft. aircraft factory at Middle River, Md. for Glenn L. Martin Co. Device consists of a single roller mounted in a simple frame on which the load may readily be pushed by hand to location on job where it is needed.

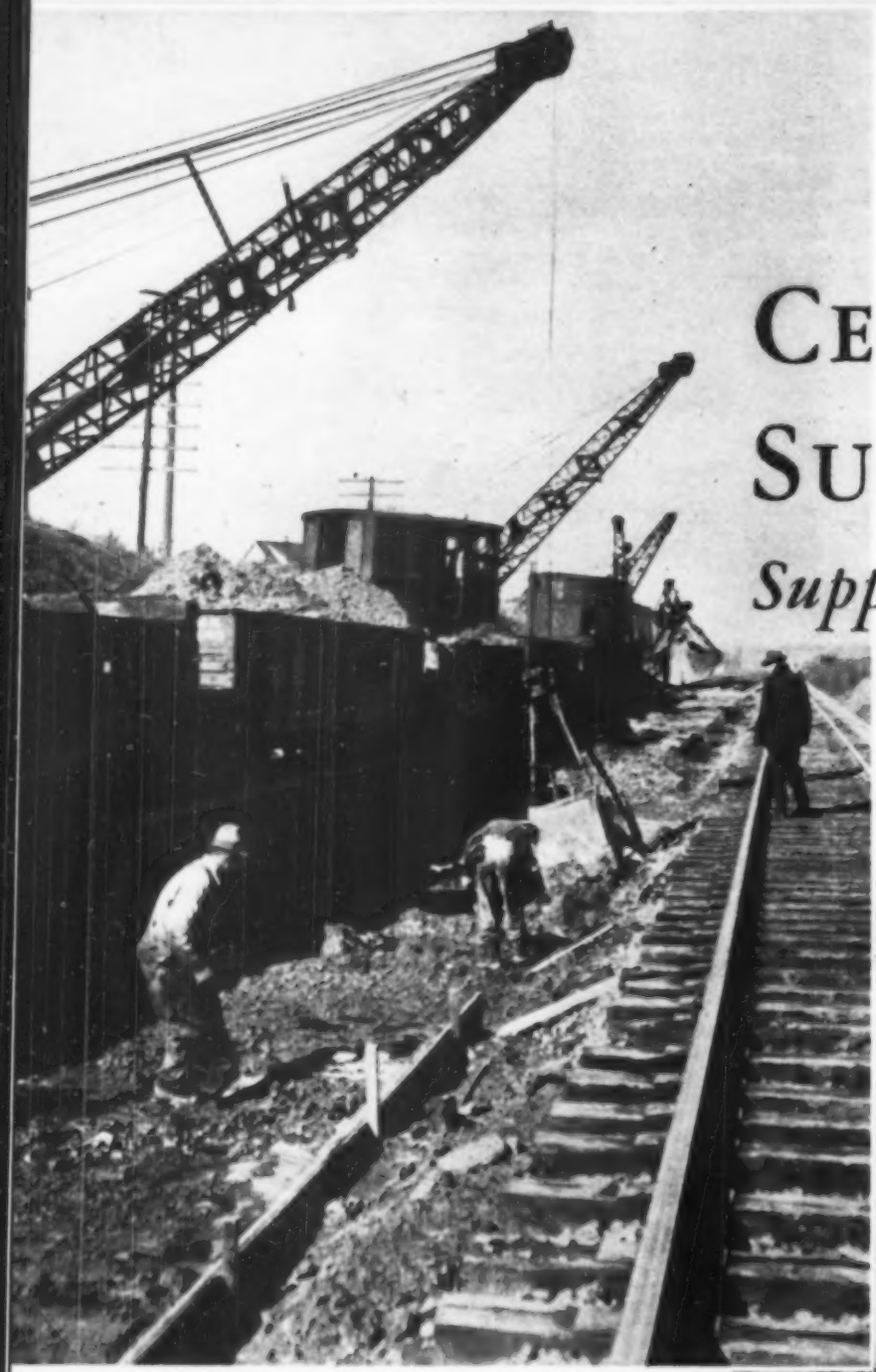
TOWER TRAVELER (below) erects cellular steel-plate sections in T-shaped legs and cross-struts of Bronx-Whitestone suspension bridge, New York City, — American Bridge Co., superstructure contractor. Derrick is raising first section of arched strut connecting legs under bridge deck. Section is hanging in position to be attached to leg at right. — Photo from MADIGAN-HYLAND, New York City, consulting engineers for Triborough Bridge Authority.



SPECIAL FORMS AND SCAFFOLDING (below) aid Turner Construction Co., New York, N. Y., in building tapered circular concrete stack, decorated with four pilasters, to height of 80 ft. for boiler plant of Navy Department's ship-model testing basin, Carderock, Md., near Washington, D. C.

CEMENT-GROUTED SUB-BALLAST SLAB

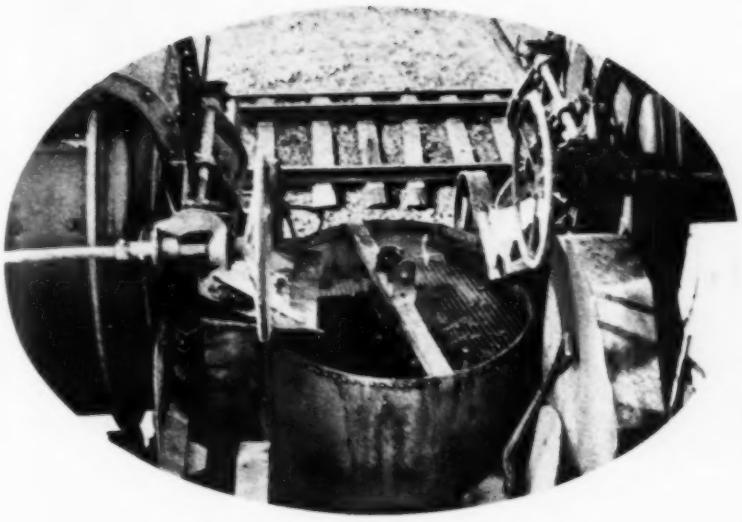
Supports Railway Track Under Heavy Main-Line Traffic



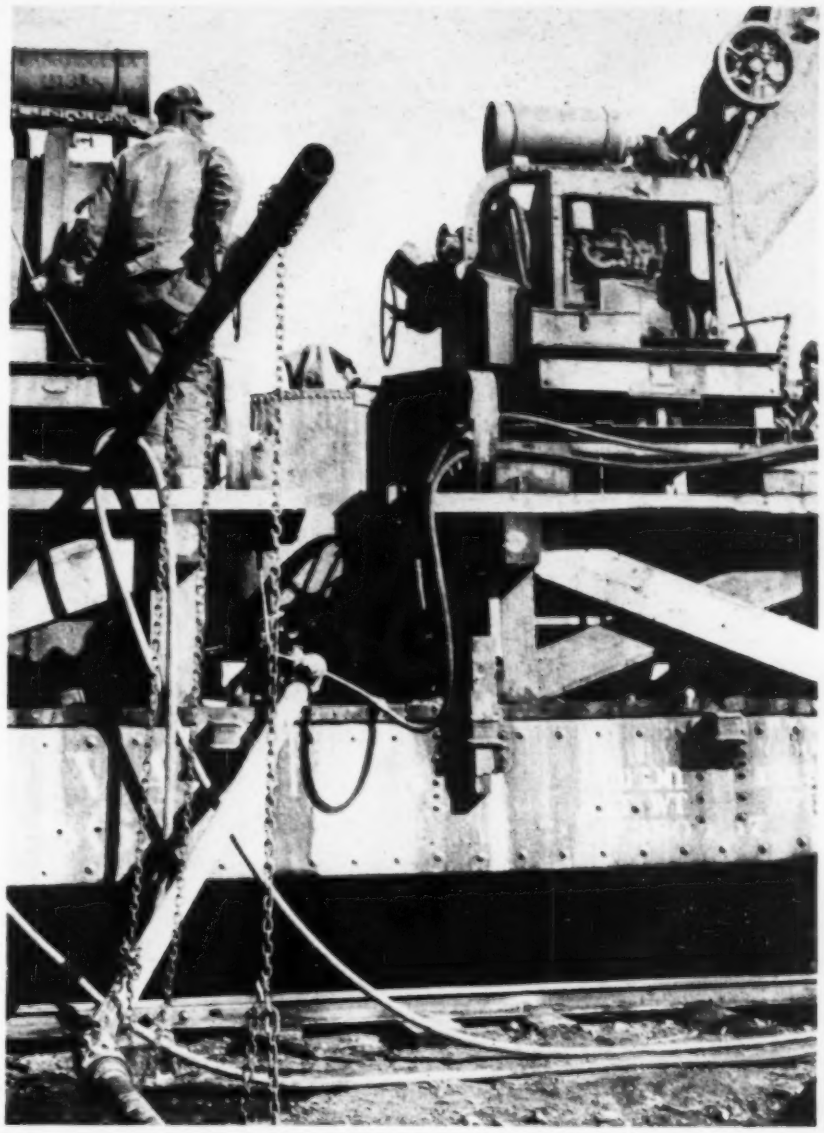
FOUR CRAWLER CRANES, MOUNTED ON GONDOLAS, excavate 2 ft. of old ballast from 600 ft. track bed. Ballast is deposited in gondolas between cranes and removed from job.

STONE IS COMPACTED with heavy 12x12-in. oak tamper operated by two men.

NEW LIMESTONE BALLAST, ranging from 2½ to 1¼ in. in size, is deposited to depth of 12 in. on finished subgrade by cranes working from gondola railway cars. Extra gang of men spreads stone to form 1-in. crown.



AGITATOR TANK, CONTAINING PADDLES, is mounted to receive discharge of two grout mixers. Large lumps are intercepted by screen over top of tank, thus preventing clogging of hose line.



MIXING OF GROUT IS DONE in two 10S mixers mounted on flat car and blocked up to discharge into 38-cu.ft. tank containing agitator paddle operated by air motor. Valve on tank outlet is 8 ft. above level of stone to be grouted.

AN EXPERIMENTAL PROJECT for study of the feasibility, construction methods, cost and subsequent behavior of cement-grouted ballast as a sub-ballast slab under heavy main-line railway traffic, was undertaken last November by the Pennsylvania Railroad in cooperation with the Portland Cement Association. The project, as set up, was to grout two 600-ft. slabs 10 ft. wide and 12 in. thick under soft track adjacent to Bedford Yard, about 9 mi. southeast of Cleveland, Ohio. More than 800 ft. of slab was grouted before winter set in when it was decided to defer further work until spring.

The location was selected and the work planned to include the following factors:

(1) Soft subgrade where maintenance had been difficult.

(2) Frequent heavy freight and passenger traffic operating at high speeds.

(3) Construction of one 600-ft. slab with traffic diverted, and a similar length with traffic maintained.

The subgrade soil is a blue clay commonly encountered in the Lake Erie region. Undisturbed, it is stiff, but under certain conditions of moisture and loading it flows laterally and loses much of its already poor load-carrying ability. Wherever this material is encountered, it introduces serious maintenance problems. Track at this point has been difficult and expensive to maintain, with corrections to line and surface required about twice a week. Frequently it was necessary to lift track at least 2 in.

After it was determined to go forward with this work late in the fall, officials of the Pennsylvania Railroad laid out the job and decided to do everything with standard materials, equipment and labor available on the Cleveland Division, supplemented by some machinery and equipment recruited from other divisions. Work started by schedule on Monday, Nov. 7, 1938.

Scope of Project — The first half of the program was to construct 600 ft. of grouted track base with traffic diverted. This was started by making "dog-legs" at each end of the 600-ft. section to connect the eastward main line into the siding. Track was removed entirely before excavation was

COARSE WAREHOUSE BROOMS are used to spread grout and aid its penetration into sub-ballast stone course.

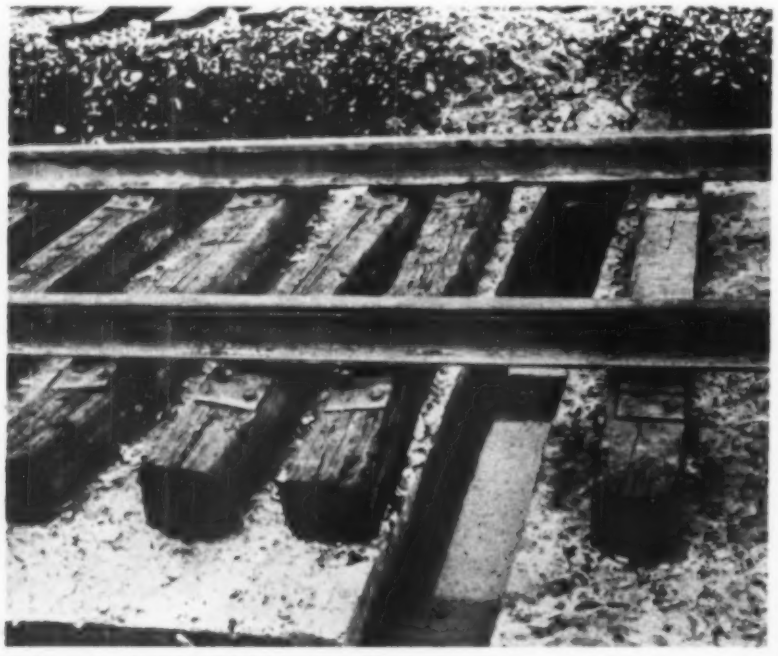
FROM END OF HOSE LINE (right) grout runs on to sub-ballast stone.

FLAT CARS CARRY GROUTING EQUIPMENT consisting of two 10S mixers; sand cars are coupled on each end of the mixer car. Outfit moves parallel to 600-ft. long job as grouting proceeds.

started. Rails were loosened by pulling the spikes on one side and barring them over on the ties. Then, without disconnecting intermediate joints, the 600-ft. lengths of connected rails were dragged westward by a work engine and left between the main tracks. Pulling the rails was completed in about 21 min. Removal of ties followed immediately with two men loosening them while 12 others, in groups of 4, carried the ties with tongs to the south bank. Removing ties required about 3 hr.

On the second day, Nov. 8, rain followed by snow, delayed work, but

(Continued on page 106)



TOP OF GROUTED SLAB is purposely left rough better to retain top ballast. Track is reassembled on the third day after grouting.

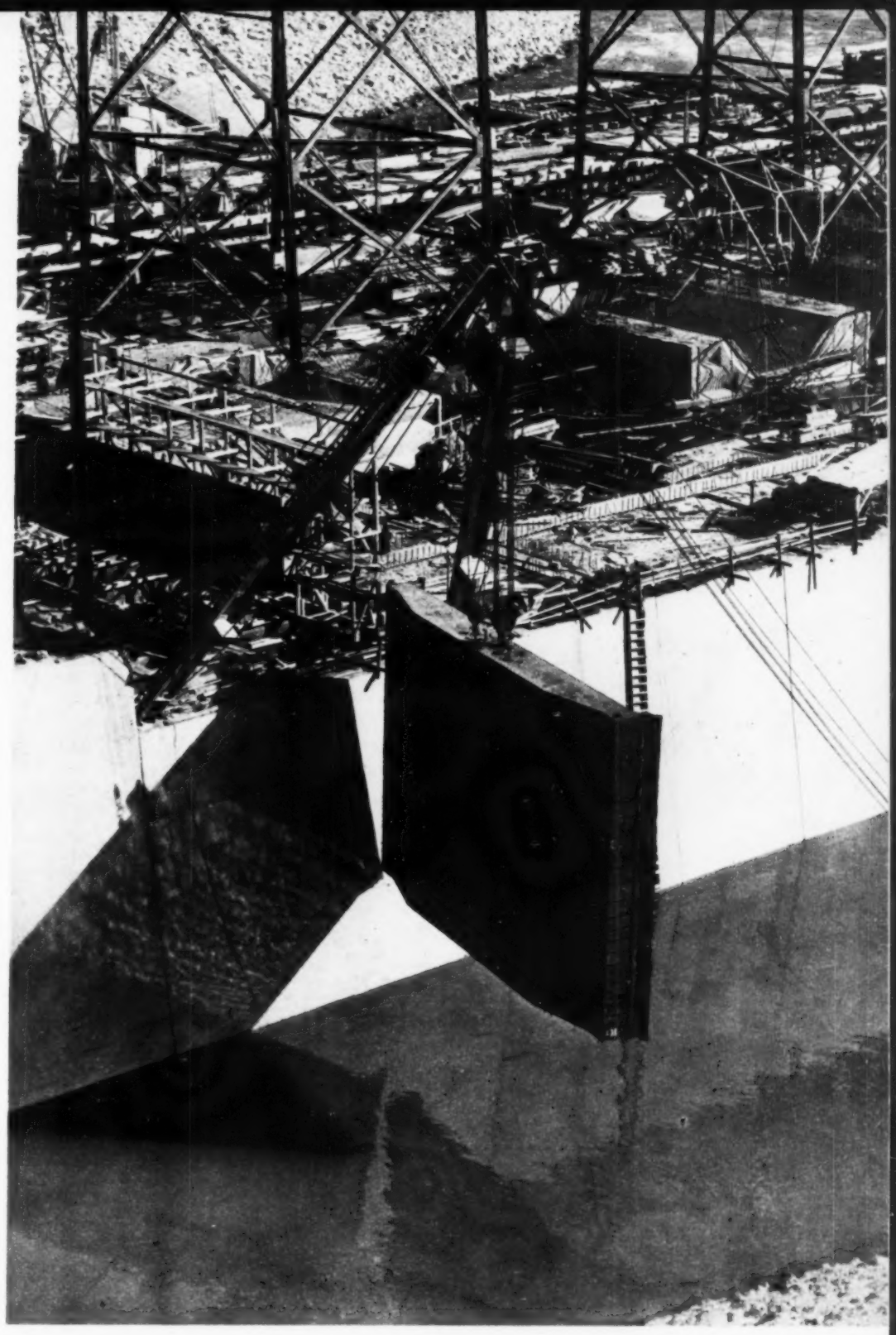
TOP BALLAST IS DEPOSITED on assembled track **(right)** which is next jacked up 12 in. from top of slab to bottom of ties. The ballast is then tamped under track. First train used track 10 days after grouting.

STEEL GATES

Close Gaps in Dam to Permit Concreting

WITH THE AID of steel gates 35 ft. high and 52 ft. wide, placed to form watertight barriers across gaps which had been left to pass the flow of the Columbia River through the base section of Grand Coulee dam, Consolidated Builders, Inc., have been able to fill with concrete the temporary openings in the spillway section. The gates, each weighing 70 tons, are lowered into place by an A-frame hoist on a barge and make watertight joints with the surfaces of the concrete blocks, each 50 ft. wide, forming the main body of the dam. As the bottoms of the spillway gaps are above the level of water below the dam, the closure gates were needed only along the upstream face of the structure.

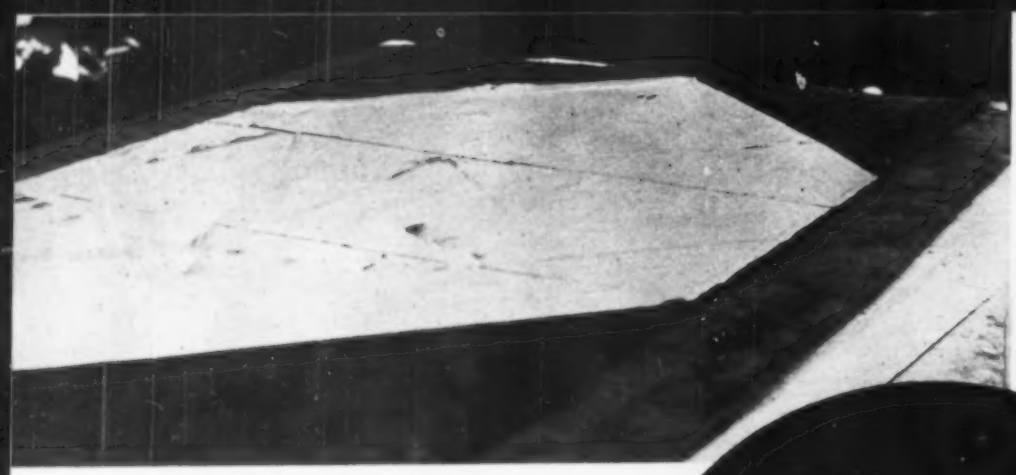
In closing the 50-ft. gaps in the dam each steel gate is seated upon a gate frame of steel H-columns, box-girder and latticed truss. The frame carries guides to receive rows of 20 steel rollers which are fitted along the vertical edges of each gate and allow it to slide down into place against hydraulic pressure. The gates themselves are made up of nine horizontal plate girders, vertical side girders and a steel cover plate on the flat, downstream face. A dressed timber filler on one flange of the H-columns of the gate frame makes contact with the concrete of the dam while a projecting piece of ⅜-in. belting, clamped between the wood and the steel, is forced by the water back of the gate into a watertight contact with the concrete. Each gate frame is suspended by brackets attached to its vertical members and hooked over anchor-bolts set vertically in the corners of the concrete blocks along each side of the gap.



HUGE STEEL GATE WEIGHING 70 TONS and measuring 35 ft. high and 52 ft. wide, is assembled on base of dam and lowered by A-frame rig ready for loading on transfer barge for delivery to point where closure of gap in spillway is to be made.

HOIST BARGE EQUIPPED WITH A-FRAME HOIST receives 70-ton steel gate from transfer barge. Hoist barge, controlled by cables, will be floated to place in front of gap in dam to be closed.

The gate is set into the frame by an A-frame on a hoist barge which is floated into position in front of the gap and controlled by cables. Watertight connections between gate and frame are made by a rubber gasket between machined surfaces of the gate and the top of the frame sill and by a ⅜-in. belt attached to the outer vertical edges of the gate and forced into contact with the gate frame by the water. With the gate in position the latticed truss at its top is removed to make room for concrete forms for the upstream face of the dam. After concrete is placed within the gap in the spillway the steel gate is removed by an A-frame hoist and loaded upon a transfer barge for re-use in closing another gap in the spillway structure.



Step by Step
FIELD METHODS

How Rubber Conveyor Belt Is Spliced at Grand Coulee Dam

1 **AFTER DIAMOND-SHAPED CUT** is made one-half way through 48-in. wide belt, linen-backed tie-gum sheet is applied.

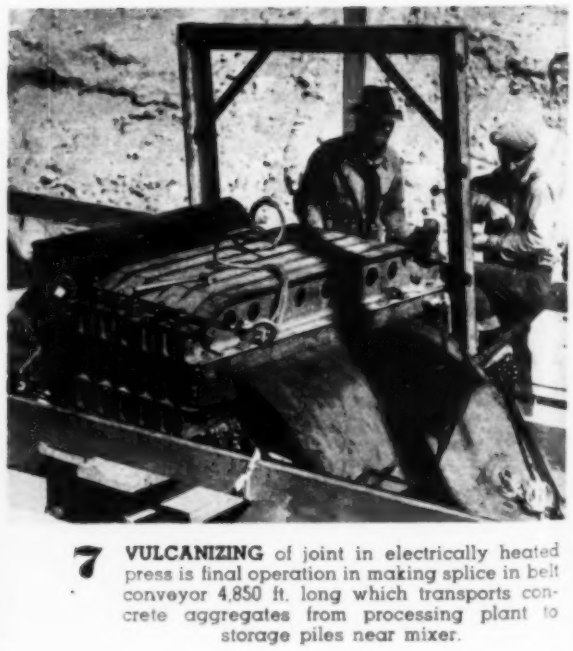
2 **LINEN BACKING (below)** is torn away from adhesive sheet of tie-gum.

3 **SWABBING OF TIE-GUM SHEET** with solution of carbon tetrachloride moistens surface and renders it adhesive. Solution also is applied to belt to remove loose rubber from canvas reinforcing.

4 **LIKE SURGEONS AROUND AN OPERATING TABLE, (right)** crew of Consolidated Builders, Inc., contractor for Grand Coulee dam, carefully join the two sections of belting.

5 **EDGES OF JOINT** are smoothed out by hammering and rolling with special hand tool.

6 **TO OBLITERATE "SCAR" (below)** at junction of two sections of belting, joint is sealed with rubber filler.



7 **VULCANIZING** of joint in electrically heated press is final operation in making splice in belt conveyor 4,850 ft. long which transports concrete aggregates from processing plant to storage piles near mixer.

Present and Accounted For

A Page of PERSONALITIES

New Divisional Heads of Associated General Contractors

DEL. E. WEBB, Webb Construction Co., Phoenix, Ariz., vice-chairman, Building Division.

F. W. PARROTT, C. F. Lytle Co Sioux City, Ia., vice-chairman, Highway Division.

T. B. CARMICHAEL, C. W. & P. Construction Co., Akron, Ohio, chairman, Building Division.

H. A. DICK, Gilpin Construction Co., Portland, Ore., vice-chairman, Heavy and Railroad Division.

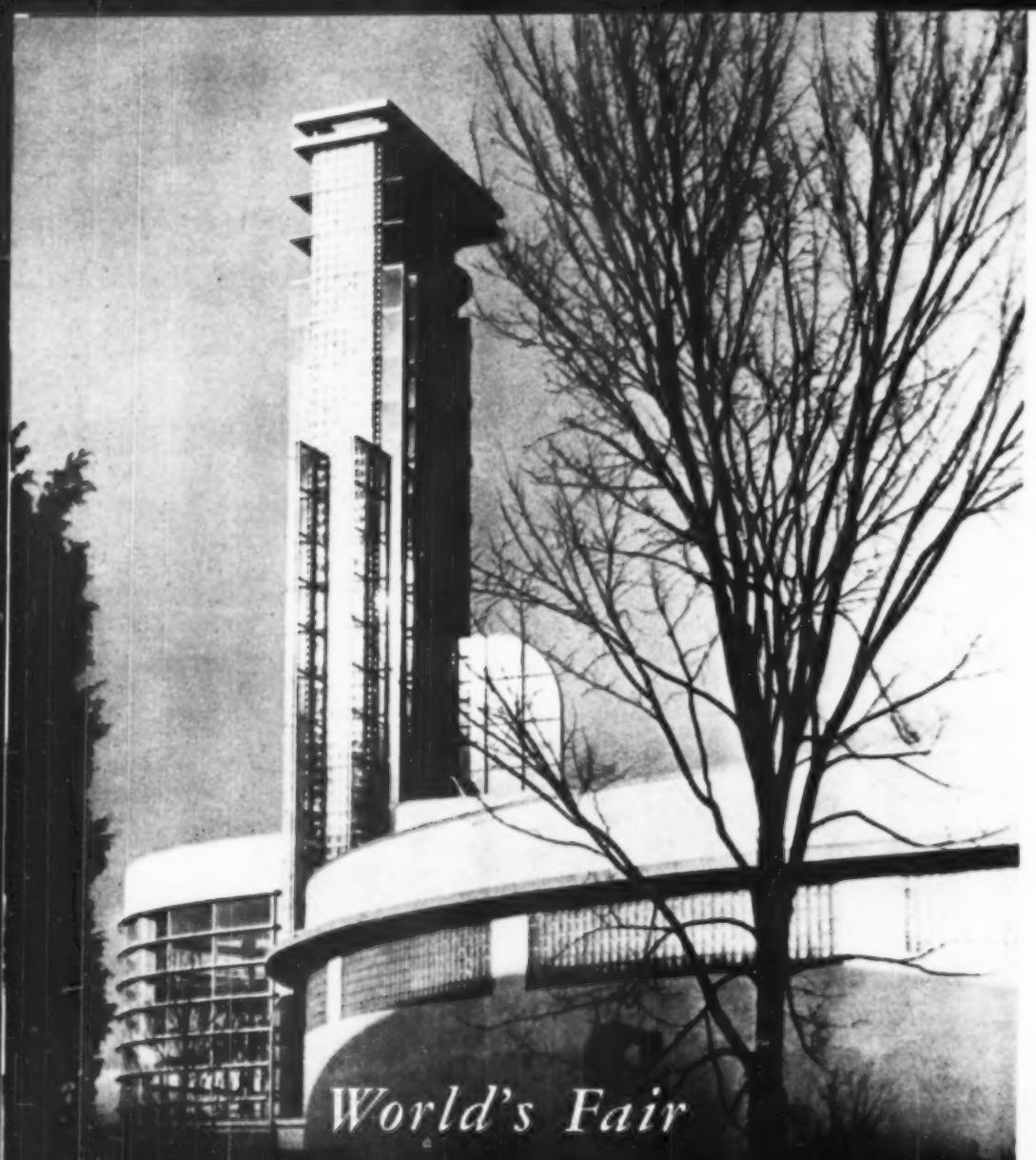
M. W. WATSON, Topeka, Kan., chairman, Highway Division.

OSCAR B. COBLENTZ, McLean Contracting Co., Baltimore, Md., chairman, Heavy and Railroad Division.

AT SAN FRANCISCO CONVENTION (below) Managing director E. J. HARDING, of Associated General Contractors, confers with retiring president E. P. PALMER, of Senior & Palmer, Inc., of New York.

AT ROAD BUILDERS' MEETING. MURRAY D. VAN WAGONER, president American Road Builders' Association, helps comedian EDDIE CANTOR throw switch that starts equipment exhibit featuring "Highways of Tomorrow."

FRANK A. BANKS, (below) construction engineer for U. S. Bureau of Reclamation on Grand Coulee dam, on the Columbia River in Washington, has been named by Secretary of the Interior Harold L. Ickes, acting administrator of Bonneville project. Mr. Banks, an employee since 1906 in the Federal civil service, which he entered as a junior engineer, will remain in charge of Grand Coulee dam, dividing his time between that project and the Bonneville project, with headquarters in Portland, Ore.



World's Fair

GLASS CENTER

Demonstrates Applications of Many Kinds of Glass

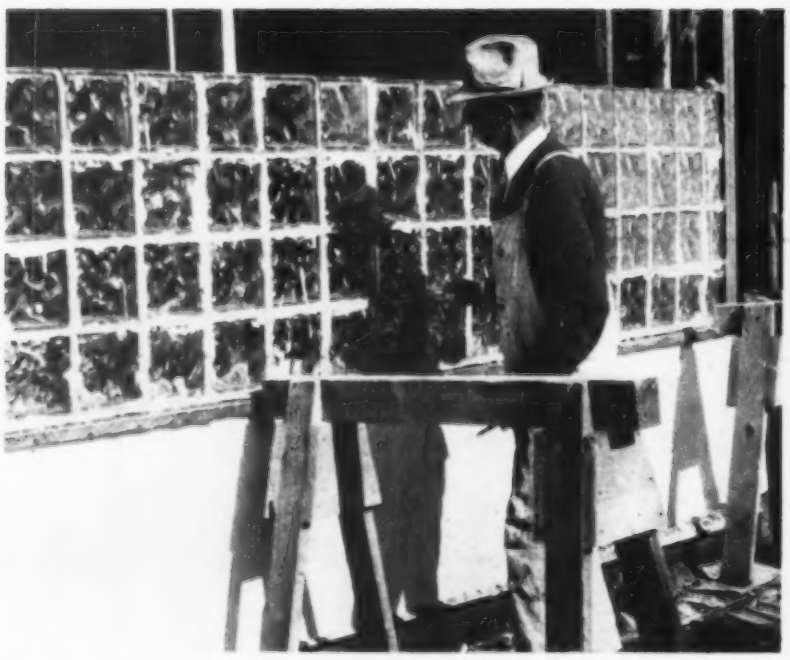
GLASS BLOCK, structural glass and plate glass cover 20,000 sq.ft. of wall area in the Glass Center erected by the A. L. Hartridge Co., New York City, from plans by Shreve, Lamb & Harmon, to house the joint exhibits of Corning Glass Works, Owens-Illinois Glass Co. and Pittsburgh Plate Glass Co. at the New York World's Fair. In contrast with many Fair buildings, designed for a short life of 2 years, the Glass Center is constructed with a view toward permanency. The building incloses 25,000 sq.ft. of floor area in a semi-circular plan imposed on a plot of 57,000 sq.ft. leased by Glass, Inc., the joint exhibiting company of the three glass manufacturers. A 108-ft. glass tower dominates the structure.

Steel skeleton framing carries floor and roof loads and supports glass and stucco sheathing of the building. Glass block is used in 7,000 sq.ft. of wall, plate glass in 7,000 sq.ft., and structural glass in 6,000 sq.ft. The tall tower is inclosed with glass block in successive tiers supported by spandrel beams and is decorated on the outside with fins of blue plate glass which at night reflect the interior illumination of the tower. A metal helix outlined with neon tubing spirals up the tower, adding to the distinctive lighting effect.

Contrasting colors of carrara glass are applied with glass block, plate glass and stucco to the exterior of the building. Throughout the interior, the designers employed glass for walls, ceilings and partitions. In the rotunda, where glass objects are produced from a furnace, the ceiling is covered by a glass mirror lighted by fluorescent tubing.

Insulux glass block, used in structural work, is a feature of the Owens-Illinois exhibit, which also shows new

DIVERSE APPLICATIONS (left) of glass block, plate glass and carrara glass to 20,000 sq.ft. of wall area feature construction of Glass Center. Tall tower is trimmed with fins of blue plate glass.



POINTING TOOL dresses mortar joints in glass block wall.

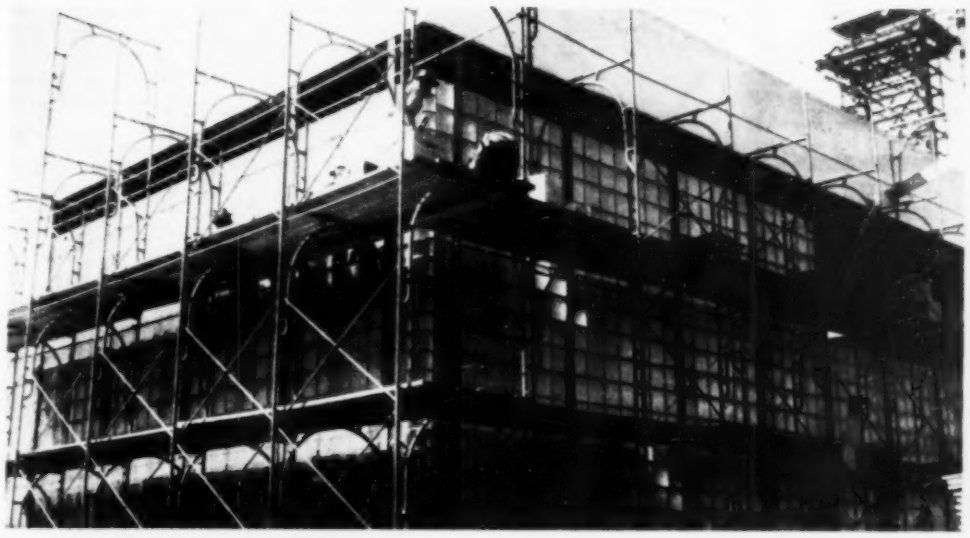
LAID UP with mortar joints by ordinary methods, glass blocks provide translucent curtain walls.

developments in fibrous glass, with special emphasis on uses of glass insulating tape.

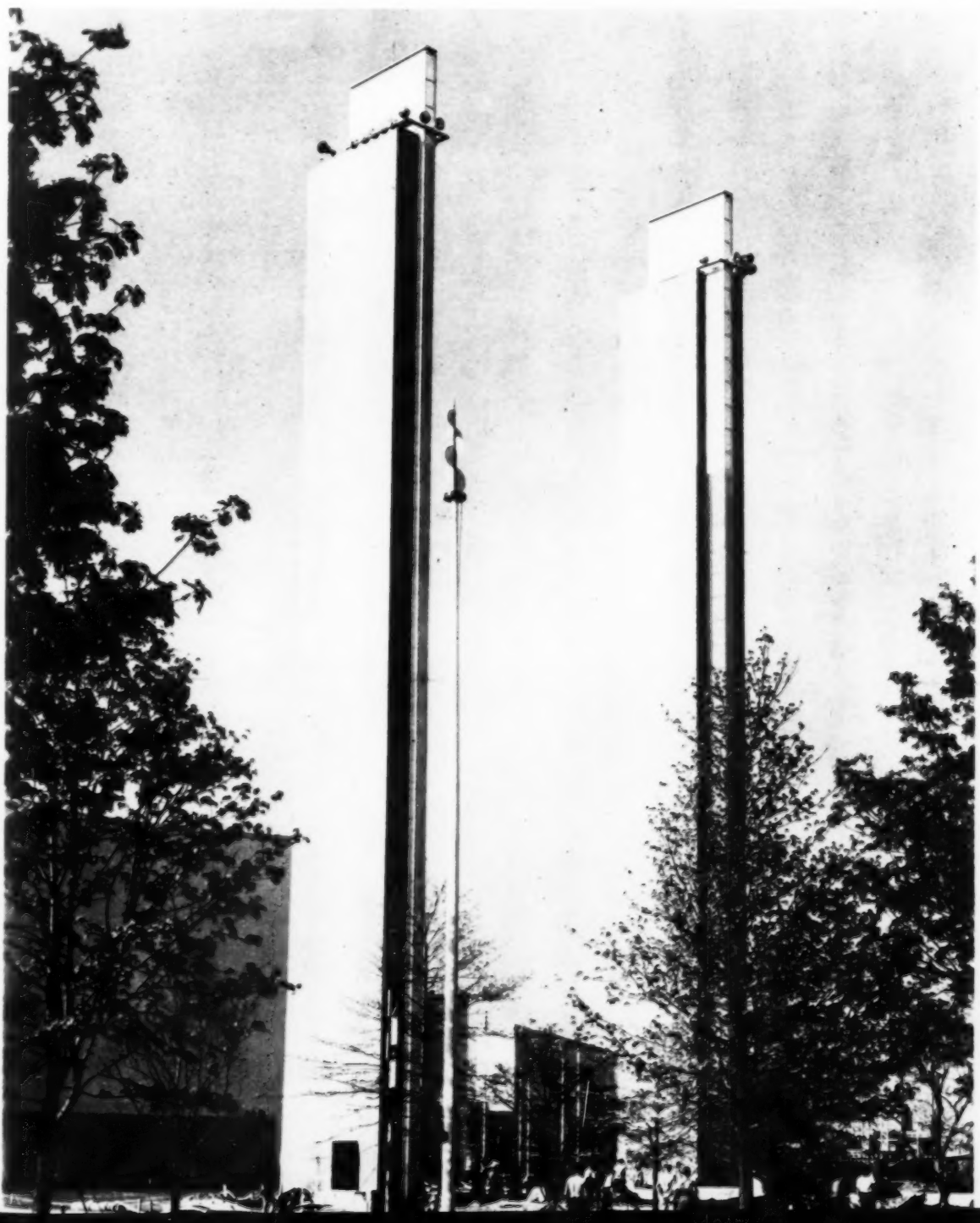
In the Pittsburgh section are twelve model store fronts illustrating applications of glass block, carrara glass and Pittco molding. Model rooms in this section have mirrored walls demonstrating shades and treatments available in modern mirrors. Hanging fins of plate glass, tinted glass and glass block, suspended from the celing across the building, show uses of transparent and translucent partitions.

Corning's exhibit includes a 60-in. telescope disk, similar to the famous 200-in. disk now being installed at Mt. Palomar, Calif., and a 20-in. scale model of the 200-in. disk. The wing opposite the rotunda, constructed of glass block, houses a continuous fiber machine making glass fabrics.

Other displays illustrate precision attainable in glass manufacture by a series of tubing molded in many forms. A transparency demonstration shows how an object may be seen through glass from any angle. Minute strands of glass attached to a revolving cylinder and shown against illumination demonstrate how light rays pass through glass.



WELDED TUBULAR SCAFFOLD, made up of sectional framed bents cross-braced with diagonal rods attached by wing nuts to welded bolts, carries masons' platforms for erecting glass block walls.



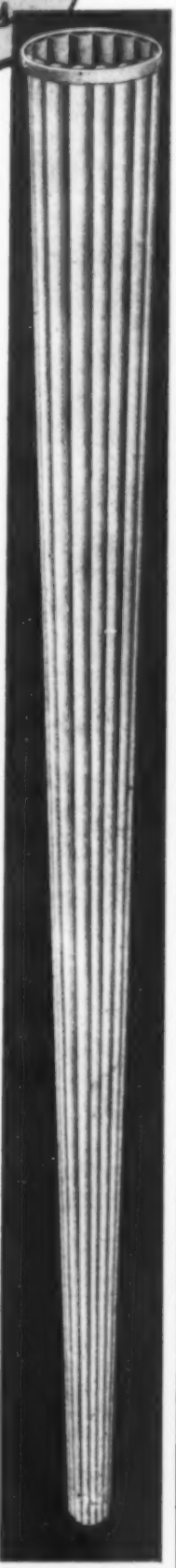
Laminated Translucent Urea Panels *Decorate World's Fair Pylons*

APPLICATION OF PURE SHEETS of translucent laminated urea plastic material has been so diversified and spectacular that the method and materials were given third award in the decorative group of the Third Annual Modern Plastics Competition, sponsored by Modern Plastics Magazine.

Illustrating the trend are two pylons towering more than 145 ft. in the air, located on the World's Fair grounds at Flushing, N. Y., each containing a column of translucent laminated urea sheets. More than 5,000 sq.ft. of translucent sheets is installed in these two towers. The largest sheets are 4x4 ft. by 1/8 in. thick, and back of these panels are 100-watt lamps. In the daytime, the sheets appear as a white column abutting the steel sheathing of the pylons, and at night the plastic shells give off a diffused white light.

Resiliency of the plastic material is expected to eliminate any breakage resulting from weaving or leaning.

Engineering Facts about UNION METAL Tapered Monotube Steel Piles



1. GREATER PILE LOADS NOW POSSIBLE

Long, tapered Monotube Steel Piles can be driven to greater depths in high load-sustaining soils, then filled with concrete, to develop load supporting values of 60 tons or more with ample factor of safety.

2. SUBSTRUCTURES OF ASSURED RESULTS

After driving, these sturdy, heavy gauge, Monotube Steel Piles can be inspected to the very toe before filling with concrete, giving visual proof to the engineer of the integrity and axial accuracy of the substructure he has designed.

3. ADAPTABLE TO VARYING CONDITIONS

Monotube Steel Piles of varying gauges, tapers, and lengths are available to meet difficult and varying soil conditions. Prompt deliveries on all types.

4. ECONOMICAL

Easier handling, lighter field equipment, speedier driving have all contributed their share of savings to make this *superior* pile available to you and your client at no greater cost.

Write today for copy of Union Metal Catalog No. 68 for complete data on Monotube Piles.

THE UNION METAL MANUFACTURING CO.
CANTON, OHIO

CONSTRUCTION EQUIPMENT NEWS

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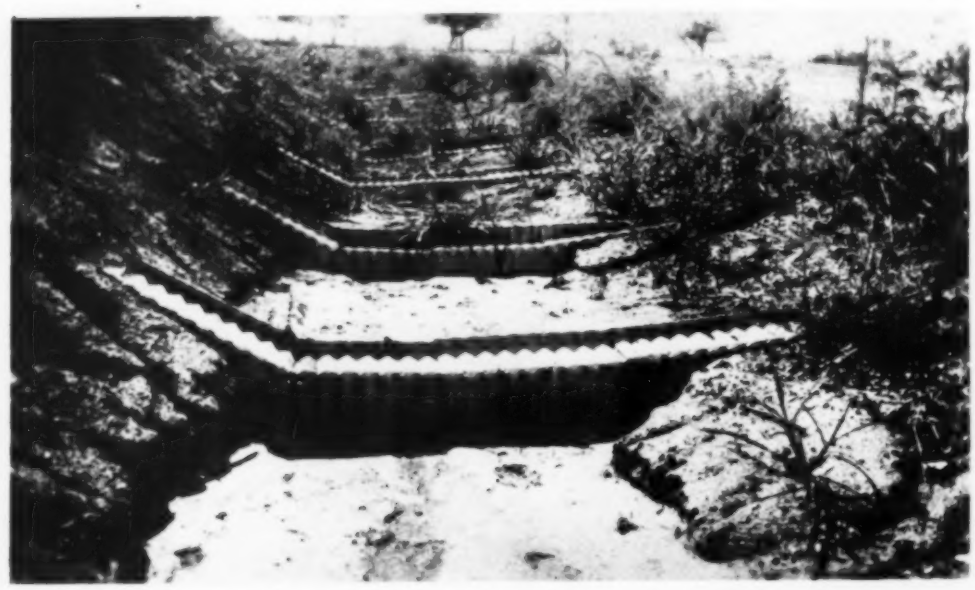
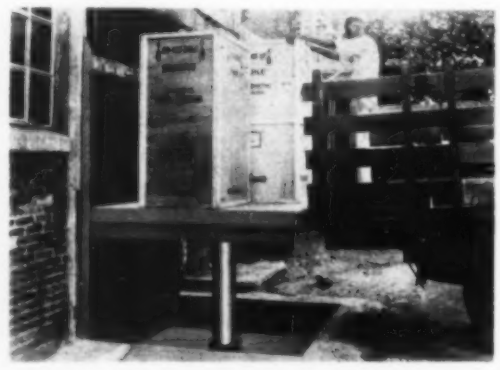
Review of Construction Machinery and Materials for JUNE, 1939

DITCH CHECKS for control of erosion of ditches along roads, railroad right-of-way, fields, clearings and reclamation projects, are composed of one or more units, each unit made of 16-gage pure iron-copper alloy sheets with 2½-in. corrugations. Width 25½ in. overall; net covering width when unit is lapped one corrugation by adjoining unit, 24 in. Standard units are formed under great



pressure; drain 2 in. high; apron 8 in. wide, and anchor, 10 in deep. Shipped nested 6 in bundle. Weight per unit, 11 lb.; bundle, 66 lb. All units given heavy zinc spelter coating after forming, to increase life and prevent corrosion and abrasion. Maul is only tool needed to install units which are driven into ground to anchor plate in bed of ditch. Important feature: shape and design of apron, bend forming anchor and apron coming at driving point giving solid driving surface. Apron also receives fall of overflow on vertically non-eroding surface, safeguarding bed of ditch. In driving ditch check into position, soil is not disturbed; no excavation is necessary. Ditch check encourages growth of vegetation. May remain permanent installation or be removed for use elsewhere.—**Central Culvert Co., Ottumwa, Ia.**

MATERIAL ELEVATORS, called Levelators and Tabelators, are designed to meet need for efficient transportation of materials between floors, eliminating existing ramps; for loading into trucks and freight cars and for eliminating hand-feeding or awkward overhead crane feeding of heavy ma-



terials. Units said to be free of all extraneous material such as cables, counterweights, brakes, dogs and clutches, heavy load-bearing side walls and other space-taking accessories. One type, Oildraulic Elevator, (oil hydraulic) uses oil as fluid, eliminating corrosion of steel and wear and tear on parts. Seven-cylinder radial pump works at higher pressures permitting use of smaller jacks, reducing cost of equipment and diameter of well holes required. Most popular unit is Electric Oildraulic type which employs electric pumping mechanism, although air is satisfactory under some conditions. Units controlled by hand lever at power unit, by pull of rope or by push buttons conveniently located.—**Rotary Lift Co., Memphis, Tenn.**

PORTABLE ELECTRIC BLOWER, called "Airmaster," is two-speed unit said to combine utility of both high- and low-speed machine. Two-speed feature makes tool useful for all jobs requiring variation

of blowing power, saving cost of second blower, while increased air output extends application of portable blower to many uses which previously could not be handled by such a unit. Additional feature is safety of machine. In hard-to-get-at places where ladder is required, operator may start

EVIDENCE OF MARION'S *Proven* PERFORMANCE

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MODERNIZE *with*

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That's what Michigan's Tandem-Drive Truck Gets in Shovel-Crane does for owners. -- steady, and out of tough places with wheels grip the powerful -- eight through positive Air Control ground! Operates driving time for trols. Model TMCT-16 means less earnings. the job - faster road travel - greater dollars. For real returns on your equipment SHOVELS. invest in MICHIGAN TRUCK
Write today for Bulletin CM69
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3/8 YD
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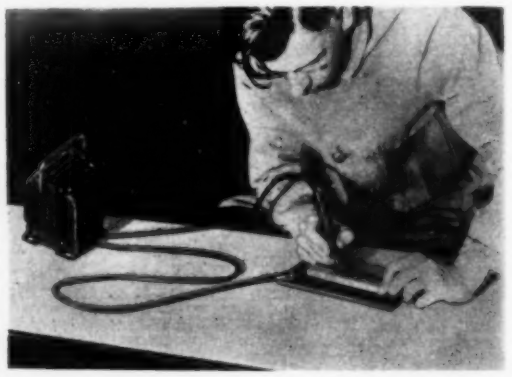
blower at low speed and switch into high speed without losing his balance. "Airmaster" develops velocity of both 20,500 and 26,000 lin. ft. per minute with capacity of both 125 and 176½ cu.ft. per minute and water lift (static pressure) of both 36 and 48 in. Can also be used with standard attachments such as suction cleaner or sprayer.—**Skilsaw, Inc., 5054 Elston Ave., Chicago, Ill.**

ELECTRIC ETCHER said to mark iron and steel and their alloys, including hardened steels, legibly, permanently, easily and economically. Used in same way as pencil, engraving names, sizes, models, numbers or other data on surfaced parts, tools,



dies, saws, plates and gears. Prevents mistakes in assembly and confusion in selection of tools and materials and lessens chances of theft or loss. Unit includes hand-piece and alloy point, transformer with three taps, special primary cord with tap-changing switch, secondary leads of No. 8 wire and work plate. Weight, 12 lb. Three etching speeds controlled by switch on primary cord. Depth of etching governed by speed at which point is moved over metal. Ready for use when plugged into suitable wall socket. Standard unit is for 110-v. 60-cycle service. Also available for other a.c. circuits.—**Ideal Commutator Dresser Co., 4102 Park Ave., Sycamore, Ill.**

CARBIDE EMERGENCY LIGHT for use on night construction and railroad work is made with special built-in valve that scientifically controls flow of water, allowing only enough to enter chamber to maintain uniform light. Danger of explosion said

to be eliminated as gas is not generated fast enough to build up explosive pressures. Rex light burns steadily for 2½ hr. or more with 250 to 350 candle power radiance, gas being released with constant flow just sufficient to keep light burning uniformly. Umbrella-like arrangement inside container holds carbide in place, preventing its movement in cylinder and consequent powdering. Placed in operation by removing hermetic seal at top and bottom of container, placing light in water 14 in. deep and lighting burner. May be deposited in bucket, in hole in ground filled with water or in ditch or stream.—**Hunter Mfg. Co., Bristol, Pa.**

PURPLE-STRAND *FORM-SET* **ROTARY LINE**

BETHLEHEM Specify FORM-SET PRE-FORMED ROPE

Here's what *FORM-SET* means

IN WIRE ROPE, individual wires and strands form a helical or screw pattern in the complete rope. Ordinarily these individual wires and strands are straight before entering the stranding and closing dies. They are forced into this helical shape and held there by seizing at the end of the rope. Remove this seizing, and strands fly apart from internal pressures.

By pre-forming rope, strands can be formed into this helical pattern before or during the closing of the rope. Individual wires are "set" in position at the same time. The result is a rope in which each wire and each strand lies in position without internal tension or pressure. Ends do not require seizing. The line might be termed "relaxed."

Form-Set is such a line. Strands have been preformed so that they are relaxed rather than being under spring tension. Not until the rope itself goes to work do the wires come under heavy stresses. As a result, the rope has greater fatigue life. It is easier to handle and break in. It spools better. It is less likely to kink. It resists whipping. Experience has shown that Form-Set gives more round trips per dollar in spite of its somewhat higher first cost.

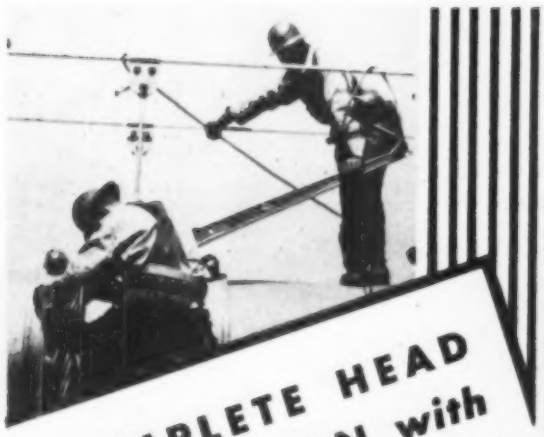
The combination of Form-Set construction and Purple-Strand quality gives you as fine a rotary line as money can buy. Designed by men who know oilfield conditions, it is built especially for the oil field.

It is produced by a company which has spent three-quarters of a century making fine steel. For these reasons hundreds of drillers consider Form-Set Purple-Strand *the* line for rotary rigs.

Bethlehem wire rope is available through distributors. Write Bethlehem Steel Company, Bethlehem, Pa., for the names of wire-rope distributors in your vicinity.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY



COMPLETE HEAD PROTECTION with REAL COMFORT

M·S·A SKULLGARDS

Whatever the job—wherever its location—today's best working hat is Skullgard! M.S.A. Skullgards give you the easy comfort of an old felt hat with the rugged head-shielding strength of laminated bakelite—sturdy protection against the hazards of falling materials, bumps, blows and jars that may occur on any job . . . non-deteriorating from the effects of exposure to water, oil or perspiration—non-conductive to electricity, lightweight and well ventilated.

And now, M.S.A. provides new versatility for America's standard work hat . . . specific new convenience as well as protection for Skullgard users who must wear goggles; for welders!

Study the briefly-described Skullgard assemblies below . . . and let us arrange to show them to you at your convenience! We'll be glad to do so, without obligation of any kind.

THE M. S. A. COMBINATION SKULLGARD-WELDING SHIELD provides finest head protection with a one-piece easy-tilting welding shield of modern design. Shield swings up out of way at will, and is quickly detachable, permitting the Skullgard to be worn separately for other work when desired.

THE M. S. A. COMBINATION SKULLGARD-GOGGLE ASSEMBLY supplies new ease and comfort for the worker who should and does wear protective goggles on the job. Clipped to an adjustable mounting on the Skullgard's brim, the goggles remain in proper position without pressure or binding on bridge of nose, temples or ears. The wearer is freed from all discomfort, and is under no temptation to remove the goggles while their protection is required.

THE M. S. A. WELDERS' EAR PROTECTORS keep sparks and flying particles out of ears, completing 100% protection. Wire mesh provides ventilated comfort; ear-muff-type spring holds unit in proper position.

MINE SAFETY APPLIANCES CO.

BRADDOCK, THOMAS & MEADE STREETS, PITTSBURGH, PA.

District Representatives in Principal Cities

CONTROLLED GRAVITY LOWERING CHAIN HOIST, called "Power Master", incorporates certain changes in spur gear design which are said to result in time and money saving and at same time to meet hardest conditions of industrial application. New

features: (1) Lowering speed controlled by clutch and governors, positive in action, so that load may be stopped at fraction of inch; (2) no hand-over-hand operation of chain to lower load; (3) free chain for quick up-or-down load chain adjustment permits regulation to load without waste motion on hand chain, and makes it impossible to drop load; (4) lubri-sealed ball bearings with planetary gear system sealed and running in oil. Capacities from 1 to 8 tons, with unit weights as low as 86 lb. for 1-ton and 169 lb. for 8-ton hoists.—**Coffing Hoist Co., Danville, Ill.**

SHOVEL-CRANE. 1½-yd. unit, convertible to clamshell, dragline or backdigger service, is mounted on newly designed chain drive crawler 12 ft. 8 in. long and 10 ft. 6 in. wide, equipped with 24-in. wide treads and with two travel speeds, 1½ and

¾ m.p.h., available in either direction. Supplied with all-welded shovel boom 23 ft. long from hinge pin to boom peak sheave pin. Each boom side member is built-up steel tube of rectangular cross-section, entirely electric welded into unified structure which combines strength of girder and torsional resistance of tube. Turntable is built to center-drive design, power being transmitted from 6-cylinder diesel motor by means of silent chain drive. Arrangement permits engine power to be concentrated on one or spread in proper balance over two or three simultaneous, synchronized operations. Capacity as crane is 25 tons at 12-ft. radius equipped with boom from 40 ft. to any desired length by insertable center sections. Backdigger boom, 24 ft. with 10-ft. 6-in. dipper stick.—**Thew Shovel Co., Lorain, Ohio.**

Answers to your problems in structural engineering always at your finger tips

EVERY man concerned with the design and construction of civil engineering structures of any type should have these practical books with their helpful tables, diagrams, reference data, best methods and details.

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Structural Engineers' Handbook Library

6 Volumes—3575 pages—fully illustrated

THE most valuable library obtainable for any man concerned with the design and construction of civil engineering structures of any type.

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They give you six well bound, fully illustrated volumes, containing 3,575 pages of practical, authoritative information covering every phase of structural engineering from foundation and substructure work to the completed erection.

Every man concerned with the design and construction of civil engineering structures of any type should have these practical books with their helpful tables, diagrams, reference data, best methods information and details. The six books are:—1. Foundations, Abutments and Footings. 2. Structural Members and Connections. 3. Stresses in Framed Structures. 4. Steel and Timber Structures. 5. Movable and Long-Span Steel Bridges, and, 6. Reinforced Concrete and Masonry Structures. With these books on hand you cannot make mistakes.

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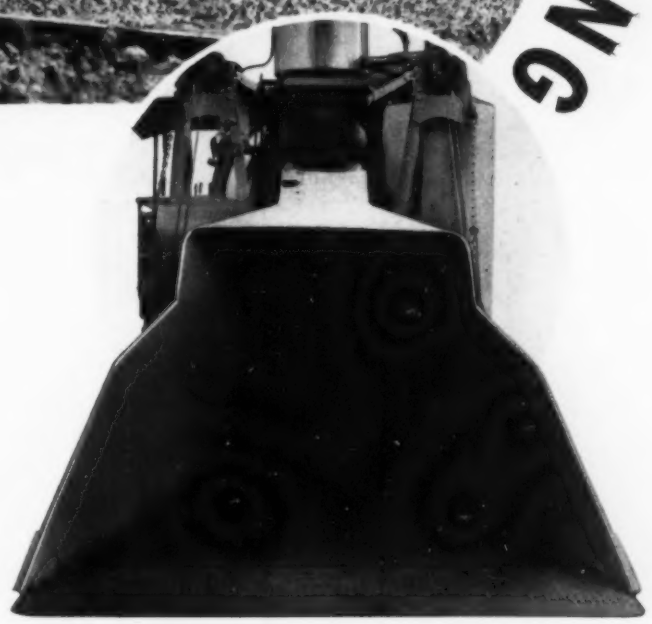
FAST-CLEAN CHARGING

High Speed Charging **without skip clogging, is an important factor for a *High Speed* operating cycle. The Koehring Paver skip is all-welded, streamlined, built without angles or sharp corners. An unobstructed, wide throat permits almost complete discharge of materials before the skip is in maximum elevated position. Heavy plate construction with replaceable liners assures a sturdy, rigid unit for batch truck loading.**

KOEHRING CO • **Milwaukee, Wis.**



Koehring 34-E Twinbatch skip is wide for convenient batch truck loading; and streamlined for fast and clean charging.

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

HOW G-E EQUIPMENT HELPS BUILD MARSHALL FORD DAM

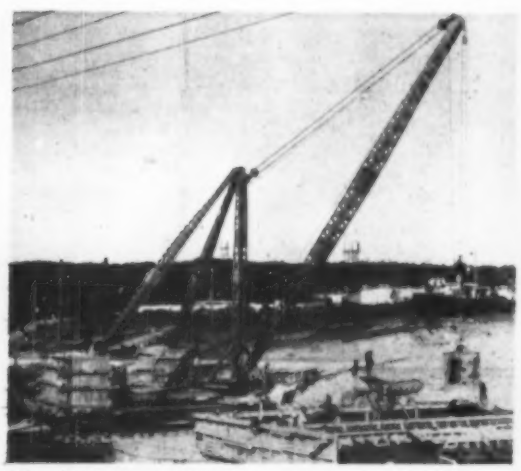
ON these two pages you see how General Electric equipment is being used in building a dam nearly half a mile long across the Colorado River. Some of these pictures show equipment used in the construction of dams only. But many of them show apparatus applicable to almost any modern construction project.

When you're planning a job, be sure to check with the nearest G-E office on your electrical problems. General Electric has sales engineers in 103 cities. Doing your work electrically may call for a larger expenditure for equipment at the beginning. But the increased ease, speed, and safety of electrical operation will often yield a bigger net.

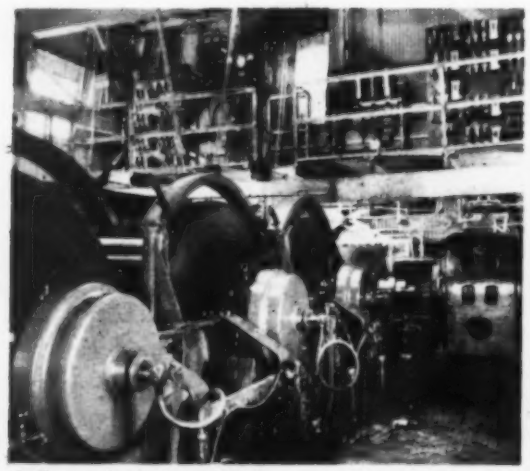
If you don't have the address of our office nearest you, write to General Electric, Schenectady, N. Y.

YOU GET GREATER SPEED AND SAFETY—CLEAR A BIGGER NET—WHEN YOU OPERATE ELECTRICALLY

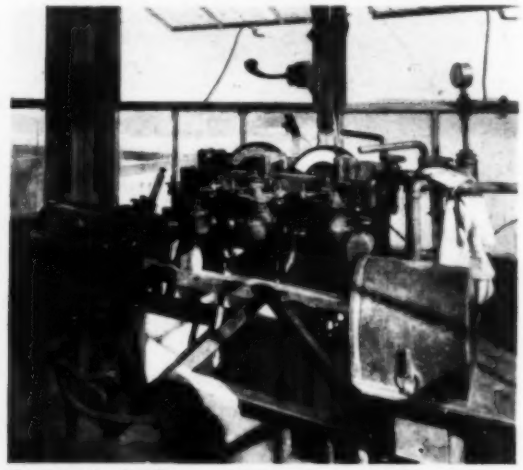
Close-up of the cableway head tower located on the bluff in the picture at right. The 20-ton cableway, 2100 feet long, is being used to place about 80 per cent of the 969,000 yards of concrete used in the dam. Electric cableways like this make possible the pouring of drier and stronger concrete mix than could be done by the old chute method—a good example of one way in which electricity has made more feasible huge projects like this dam



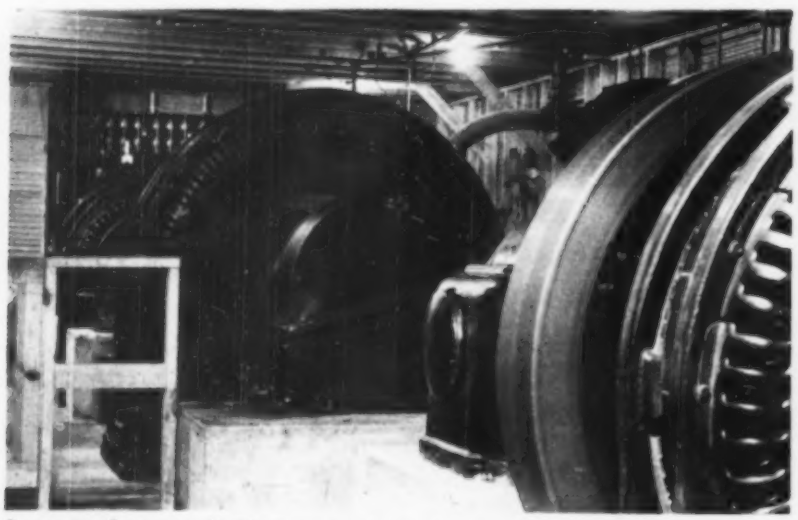
Placing concrete with a G-E equipped derrick on the sections of the dam beyond reach of the cableway. Electric drive gives fast, smooth acceleration and accurate speed control



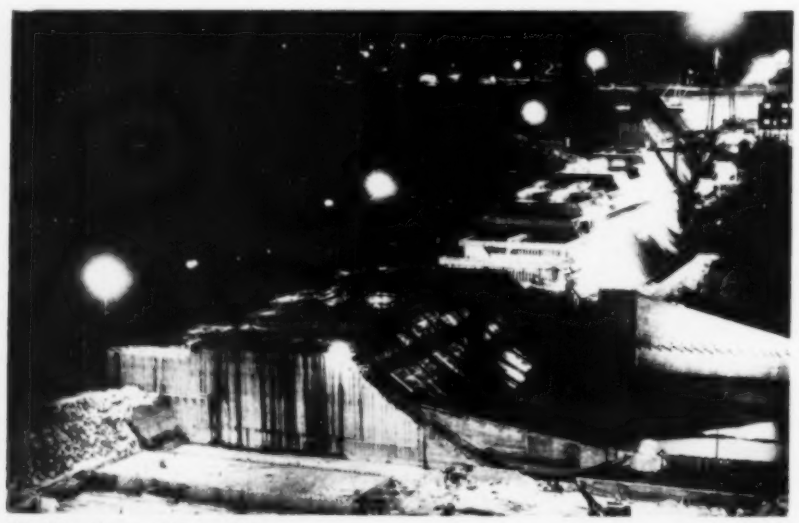
G-E a-c hoist control and a G-E 400-hp adjustable-speed motor which operates the cableway hoist drums. Operators like G-E hoist control because of its great flexibility



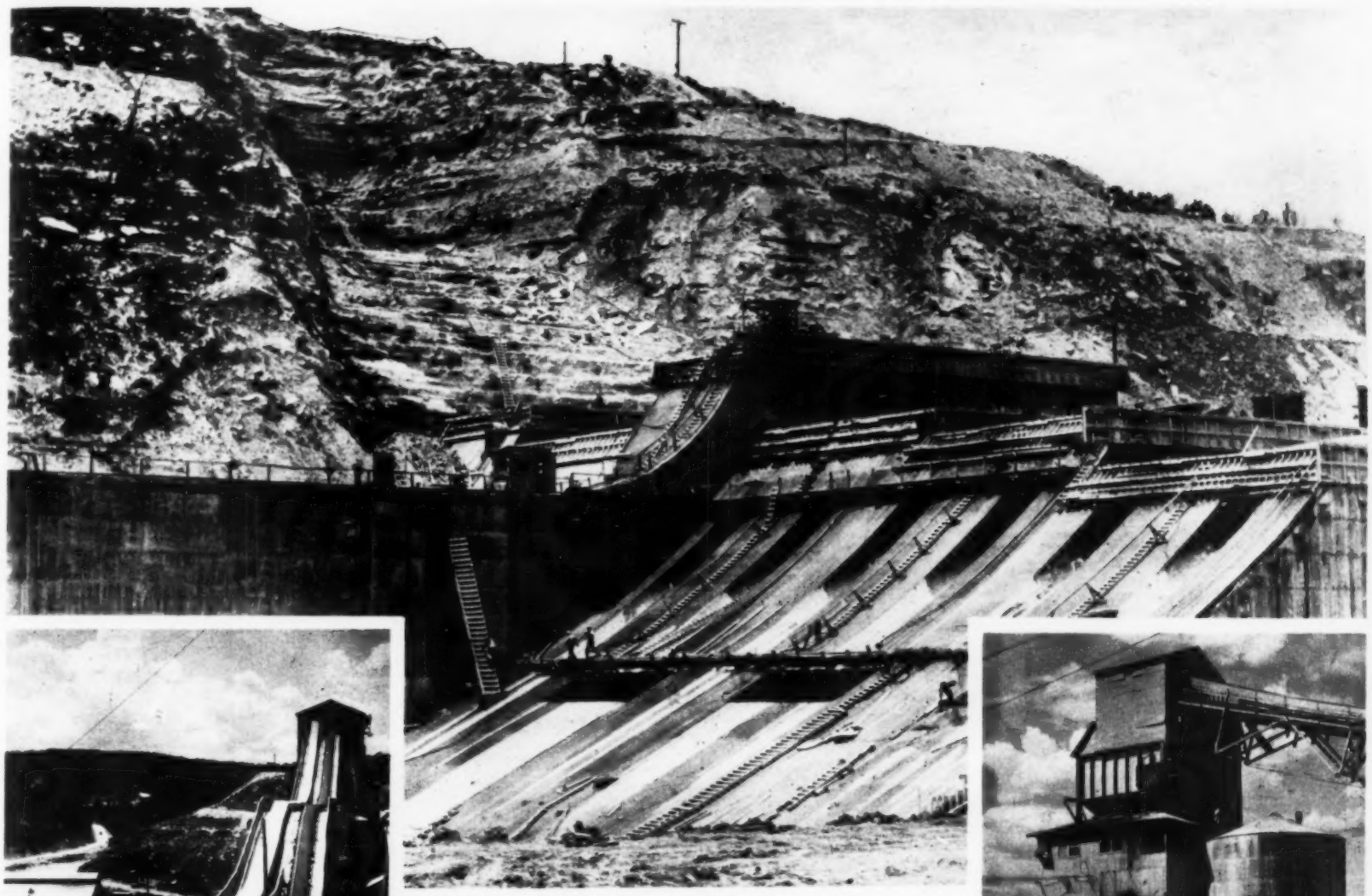
Control station in the operator's room (which is shown on the head tower above). The G-E drum switch at the left controls the main motor; that at the right, the trolley motor



Improved power-factor results from the use of the three G-E synchronous motors shown above for driving air compressors. Synchronous motors are preferred for compressor drives and for most constant-speed loads

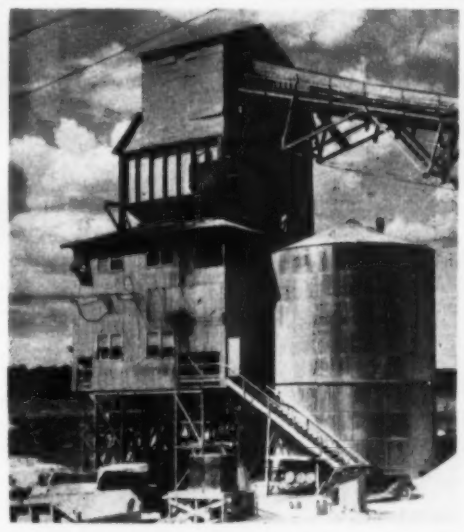


Night view of the dam. Adequate floodlighting makes construction work safe and speedy by night. G-E floodlights are easy to mount, they direct light exactly where you want it, and prevent shifty shadows



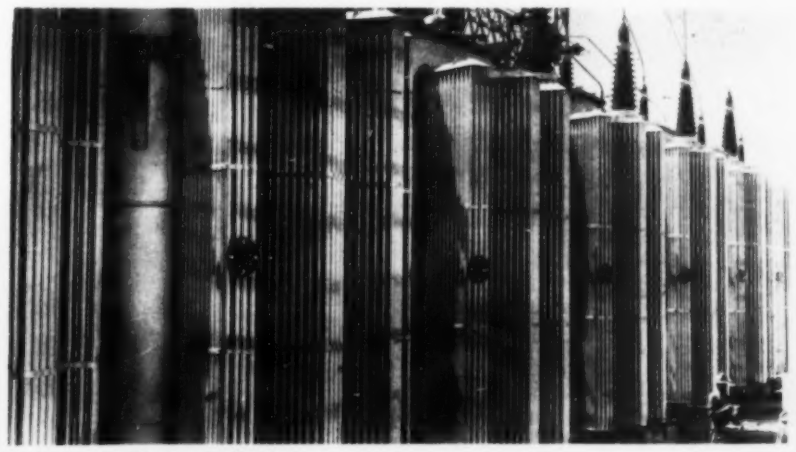
Marshall Ford Dam, rising out of the Colorado River 22 miles upstream from Austin, Tex. It will be 190 feet high and nearly half a mile long, with a 730-foot overflow spillway at the present river channel. A concrete gravity structure, the dam is so designed that it can be raised in the future to a height of 265 feet. The total contract, let to Brown & Root, Inc. and McKenzie Construction Co. of Austin is $5,781,-235

Two of the many G-E equipped conveyors. These two bring material from storage bins and from railroad yards to the mixing plant. The one at the left, for cement, is driven by a 15-hp G-E motor. That at the right, for aggregate, is powered by a 50-hp G-E motor



Concrete-mixing plant, operated by G-E motors and control. Electrification can often provide for almost automatic operation of mixing plants through the use of photoelectric relays in weighing batches and controlling bin levels

A 100-hp G-E motor moves this 2-mile aerial tramway for concrete aggregate. Tramway has 85 buckets of 36 cu ft each



Permanently installed at the damsite by the Lower Colorado River Authority are these seven G-E self-cooled 6667-kva transformers

GENERAL ELECTRIC

011-443A

And when a Haiss bucket licked this dredging job for a bridge pier foundation where others had failed—*enough said.*

PRICES AND CATALOGS ON REQUEST

HAISS Hi-Power

FOR PAY LOAD CLAMSHELL DIGGING

In stock at New York, Philadelphia, Baltimore, Atlanta, Hartford and Los Angeles

GEORGE HAISS MFG. CO., INC., 139th ST. & CANAL PLACE, NEW YORK—DISTRIBUTORS EVERYWHERE

The Shovel With The Perfect Balance

Try This Test

• Lay one of these new ABW Solid Shank Shovels on a table or desk, balanced with the blade and socket projecting over the edge of the table and the handle poised free of the table. Then tip the blade down to either side, release and watch the shovel right itself. This is the perfect balance which no other solid shank shovel has.

● A new re-designed socket gives to the ABW Solid Shank Shovel a perfect balance. The new high bend has achieved for this famous shovel a balance unequaled in any other solid shank shovel.

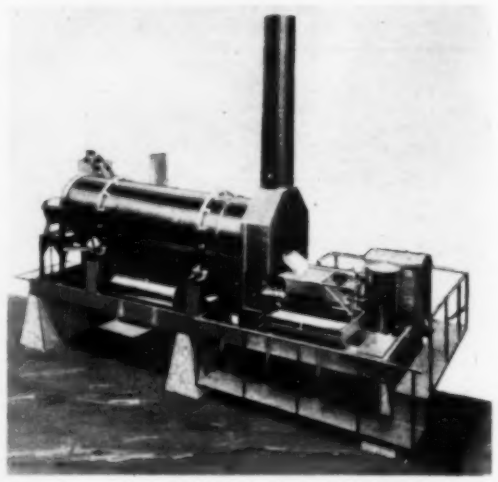
To the users of shovels this is a most important development and one that will be welcomed by buyers of shovels. Added to this exclusive feature ABW Solid Shank Shovels are equipped with the famous Shock Band, which gives more handle strength to the shovel.

Made from one solid bar of steel ABW Solid Shank Shovels are the strongest shovels made, give the longest service and with their perfect balance, make for easier shoveling. Ask your jobber about this new re-designed bend and the perfect balance.

AMES BALDWIN WYOMING CO., Parkersburg, W.Va., North Easton, Mass.

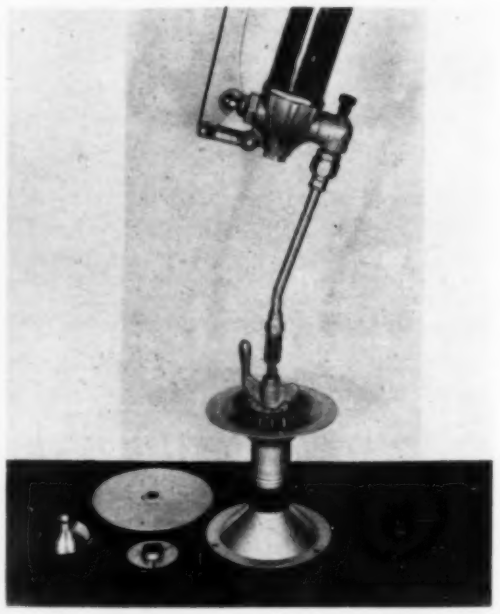
ABW Products: Shovels, Spades, Scoops, Forks, Hoes, Rakes, Post Hole Diggers, Agricultural Handles

MEDIUM CAPACITY ASPHALT PLANT for use in maintenance and production jobs has capacity of 12 tons per hour. Aggregate dryer 46 in. in diameter and 15 ft. long, is equipped with cascading shelves and also center cross flights which increase amount of hot steel on which aggregate is dried. Dryer



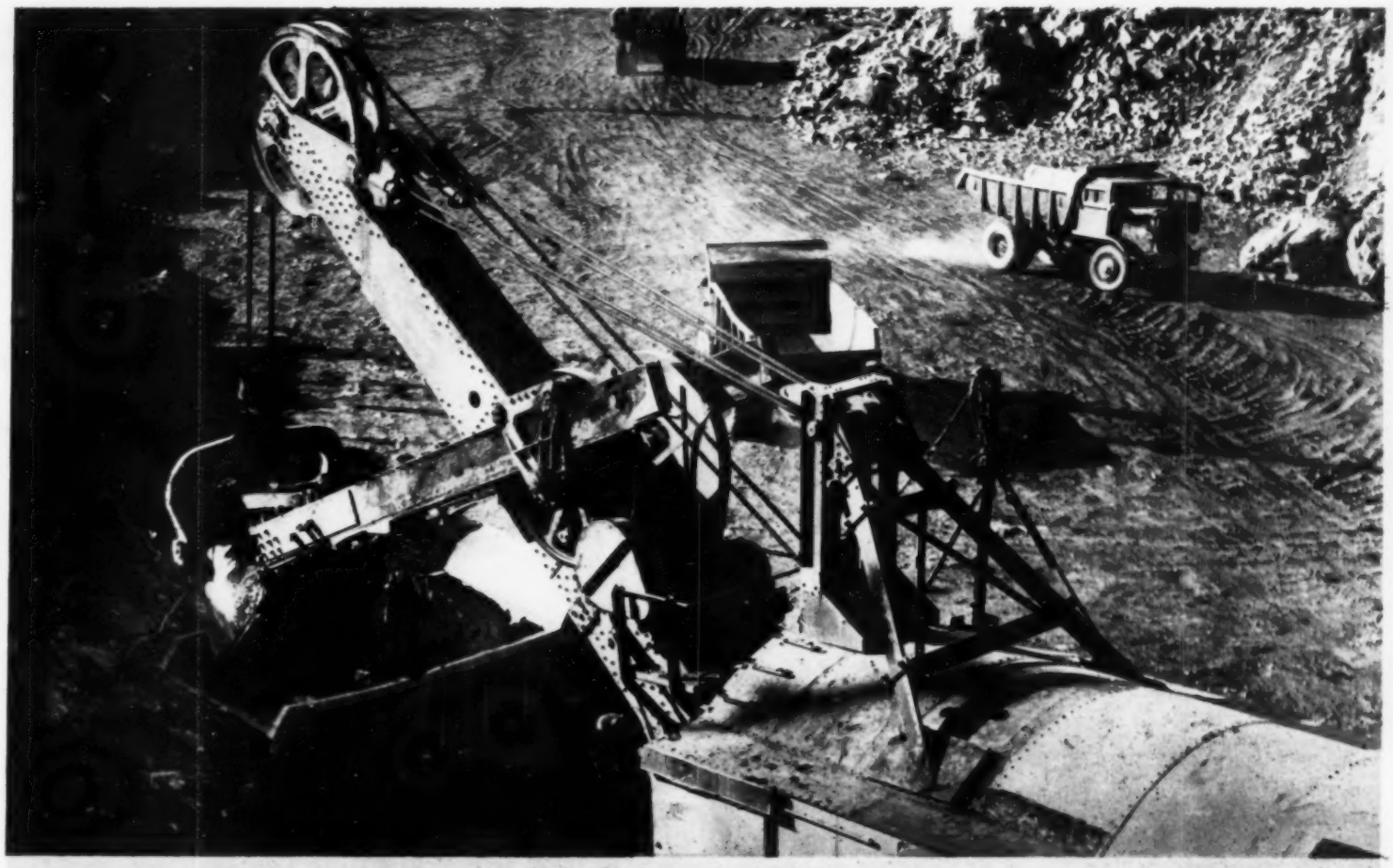
equipped with inspirating-type low pressure oil burner and exhaust stack, no exhaust blower being necessary. Material is fed to dryer by elevating loader. Discharge chute from dryer, measuring hopper and pug mixer all air-operated. Equipped with 300-gal. bitumen heater with oil burner. Driven by Continental engine with Le Roi compressor. Can be had as portable machine on pneumatic-tired wheels. Weight, 21,500 lb.—**White Mfg. Co., Elkhart, Ind.**

WHEEL-BEARING LUBRICATOR, adaptable both to ball and roller bearings on all makes of passenger cars and trucks, is said to reduce ordinary lubricating job from a tedious hit-or-miss affair to an easily handled, thorough job. Uniform distribution



of lubricant, as well as time saving, is now promised by Alemite engineers. After being thoroughly cleaned, bearing is placed in cone-shaped lubricator around hollow, threaded spindle equipped at top with standard fitting and sealed tight to sides of cone by adapters held in place by clamp. Alemite grease gun forces lubricant down through spindle into apex of inverted cone. Under pressure, lubricant is forced into bearing, after which it is ready for replacement in wheel. Lubricator easily attached to work-bench or table.—**Alemite Division, Stewart-Warner Corp., 1826 W. Diversey Parkway, Chicago, Ill.**

PORTABLE STORAGE BATTERY HAND LAMP, useful for builders, contractors and engineers wherever quick dependable light is required in regular and emergency work, is said to cast beams more than one-half mile distant and to burn 10 hr. on one full charge of its battery. Auxiliary bulb operated by independent switch will burn 60 hr. Features: (1) Specially designed rubber reservoir



"For 18 Months on this big job . . . GULF PARVIS OIL has helped keep our equipment in efficient operation" . . . SAYS THIS SUPERINTENDENT

Overhaul periods for Diesels in trucks, compressors, tractors and drilling rigs have been extended well beyond 5,000 HRS.

"Our maintenance costs have been very low on this job," says this superintendent. "We've had remarkable efficiency from our Diesel equipment with Gulf Diesel Lubricating Oil in service."

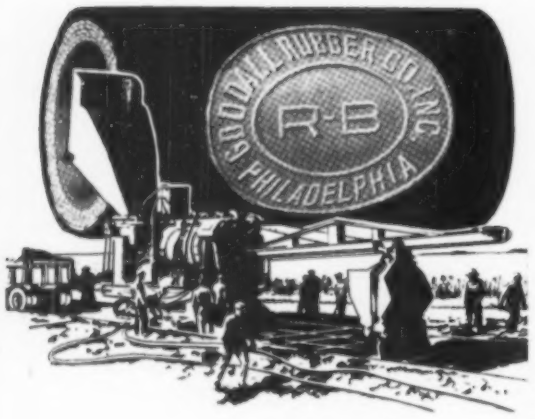
You can expect such performance as this from your Diesels when you standardize on Gulf's higher quality oils and greases. These better lubricants are manufactured to provide an extra margin of operating safety, insuring full protection against the common run of engine troubles. Ring sticking, cylinder wear, ring wear, gum formation and objectionable deposits are minimized by the proper use of the right grades of Gulf's higher quality Diesel lubricants.

They are quickly available to you through more than 1100 Gulf warehouses located at principal distributing points from Maine to Texas. Ask the Gulf engineer to check over your equipment and recommend the lubricants which will best suit your needs. He can be of real assistance—and you will not be obligated.

GULF INDUSTRIAL LUBRICATION

GULF OIL CORPORATION • GULF REFINING COMPANY
PITTSBURGH, PENNSYLVANIA

Keeps the Job MOVING!



GOODALL

"ROADBUILDERS" HOSE

Look at the performance record of this quality hose, and you'll discover why contractors who watch their costs continue to order "Roadbuilders" for their paving and mixing equipment. They have discovered it to be the best kind of insurance against shut-downs and delays, because it is so thoroughly reliable in withstanding the severe surface wear, high pressures and generally *tough service* that hose in this type of work is subjected to. Its reputation for keeping the job moving — at a profit — has made its use an established practice among increasing numbers of road-building contractors.

Goodall "Roadbuilders" Hose, with the dark red cover, can always be identified by the Goodall label. Carried in stock at all branches, for immediate shipment, in sizes 1" to 2", inclusive, maximum lengths of 50'.

A Goodall "Standard of Quality" Product
(Reg. U. S. Pat. Office)

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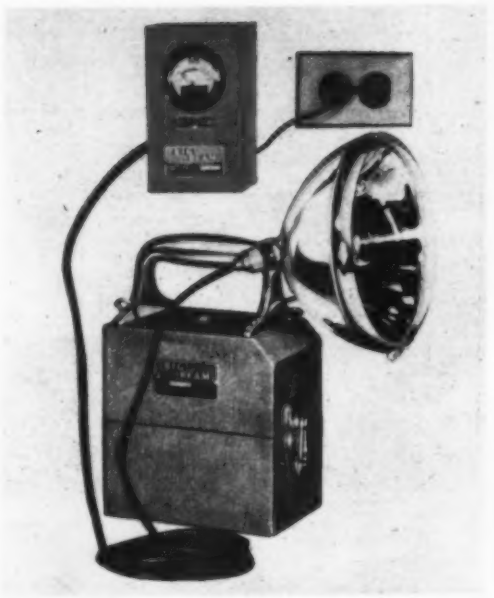
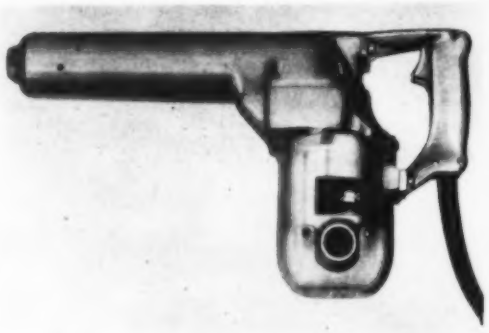
GOODALL — The originators of the Standard of Quality Line (Reg. U. S. Pat. Off.) of contractors rubber goods



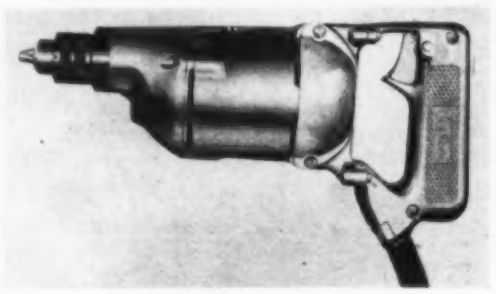
seals in battery vents collects fumes, prevents spillage, eliminates corrosion of terminals and protects clothing; (2) battery may be re-charged through lamp head without removal from case. Dashboard type switch makes possible charging of lamp battery direct from charging system of automobile, truck or motor boat.—**U-C-Lite Mfg. Co., 510 N. Dearborn St., Chicago, Ill.**

PORTABLE ELECTRIC HAMMER, redesigned to increase motor power and efficiency in order to insure faster drilling and to increase life of moving parts, is self-contained unit powered by universal



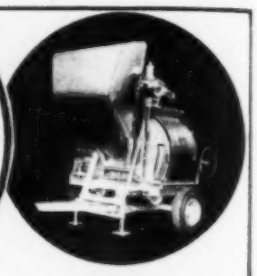
motor. Requires no transformer, rectifier or other extra equipment. Action developed by oscillating weight and spring assembly, weight driven indirectly by crank. Motor is mounted at right angles to barrel and operates through train of reducing gears. Develops 2,300 blows per minute. Capacity in concrete or brick, 1 1/8 in. Weight, 17 lb. Especially useful for drilling and channeling in concrete, stone or brick; removing form marks from concrete surfaces; calking joints and seams in tanks and pipe lines; tamping molds and concrete forms; vibrating concrete forms for smooth finish; gouging and shaping wood beams and timber.—**Black & Decker Mfg. Co., Towson, Md.**

BALL-BEARING DRILL, 5/16 in., for use with carbon bits and for general utility work, has no-load speed of 1,100 r.p.m. Capacity is 5/16 in. in steel and 5/8 in. in hardwood. Deep groove ball bearing or



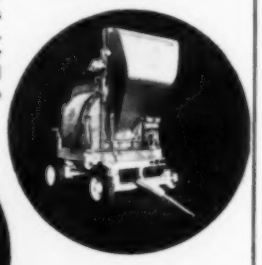
chuck spindle with inner and outer races locked in place absorbs thrust in all directions. Splined gear mounting on spindle increases strength and reduces noise and wear; removable commutator covers allow for easy brush inspection. Additional chuck capacity makes drill desirable tool for maintenance and repair work.—**Van Dorn Electric Tool Co., Towson, Md.**

TOP PROFIT MAKERS

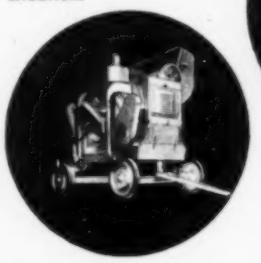


New CMC fast moving, high production, Two Wheel End Dischargers in 5s, 7s, 10s and 14s sizes.

Big daily output with lighter weight and new, fast handling ease are features of these new CMC Mixers. Two wheelers and four wheelers — Side and End Discharge meet every job situation.



New CMC 14s 4-Wheel End Discharger. Large output, fast, lighter weight. Also available in 7s, 10s.



New CMC 4-Wheel Side Discharger. Available in 5s, 7s, 10s and 14s sizes.

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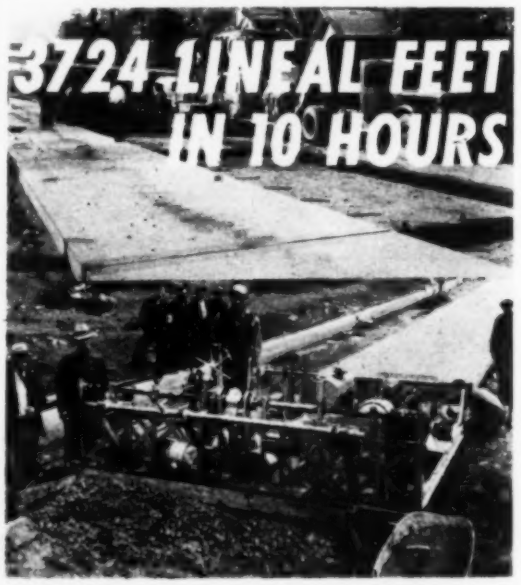

This remarkable paving speed was accomplished by Vincent Schiavi at Annapolis — using a "FLEX-PLANE" wide screed finishing machine — the average time for the job being 281.25 feet per hour. Width of pavement 10 feet — Dual Drum mixer used. "FLEX-PLANE" equipment earns *profits*.

Lower photo shows close view of a "FLEX-PLANE" vibrated wide screed finishing machine. Note: Coarse dry mix and perfect finish in one pass!!

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WARREN, OHIO

One operator; one tractor; but all the flexibility of two separate units. That's what you get when you mount a Bucyrus-Erie Bullgrader on an International Tractor and hook a 4-Wheel Scraper on behind. With this fast-moving dual unit, one man can handle the entire range of dirt moving, road grading, and finishing in a way that means new lows in cost and new highs in convenience and profit.

Double your Tractor's Usefulness
Multiply your PROFITS

Bullgrader and 4-Wheel Scraper may be operated separately or at the same time. You can grade while carrying a heaping load to the dump, and keep the hauling road and cut in good shape while returning from the fill to pick up another Scraper load. Bullgraders and Scrapers are available for 50 to 75 h. p. tractors. See your nearest International TracTracTor dealer for facts on the new low-cost, big-output performance of these dual units.

Bucyrus·Erie

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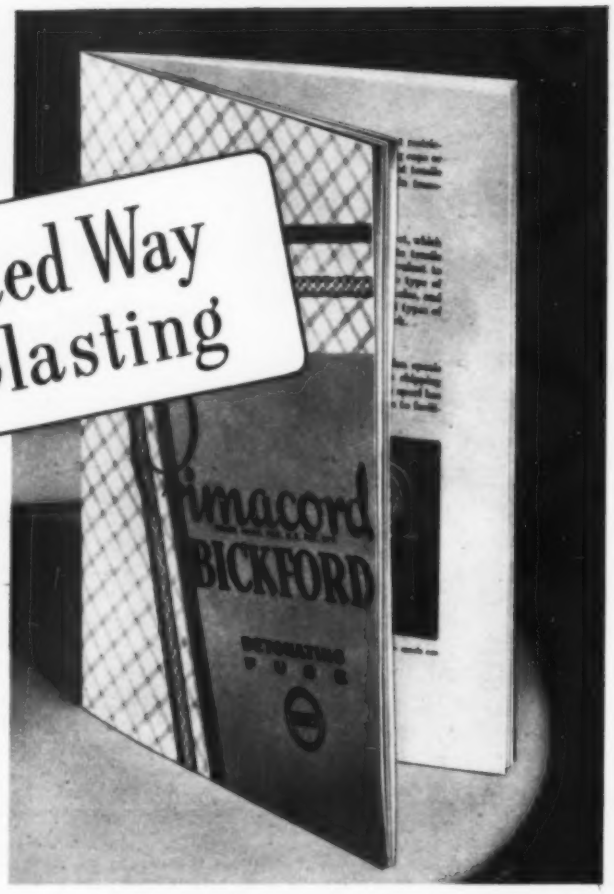
THE ENSIGN-BICKFORD COMPANY
SIMSBURY, CONNECTICUT, U.S.A.
Makers of Cordeau-Bickford Detonating Fuse — and Safety Fuse Since 1836



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● Primacord is *performance-proved* — tried and tested on all sorts of blasting jobs and found successful in every way. This insensitive high-velocity detonating fuse, with a core of PETN in a waterproof textile covering, is tough, flexible, easy to handle and amazingly effective. It saves time in loading and connecting up holes — develops more work from explosives. Use Primacord to reduce costs, get better results and safeguard your profits.

Be sure to get your copy of the Primacord-Bickford Booklet, which gives complete information on this improved detonating fuse.

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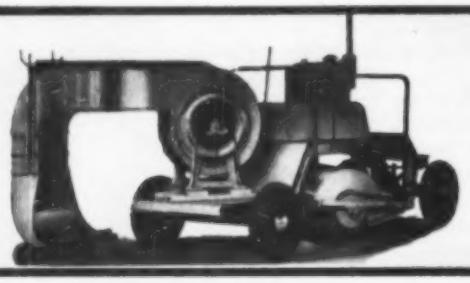
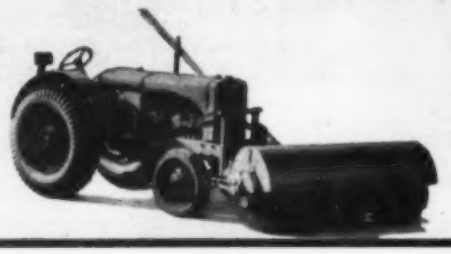


Hough-Universal Sweeper-Blower



Hough Tractor Sweeper

Meet The Hough Sweeper Family

A Group of Cost Reducing Machines You Need!

Five field tested, time saving, cost reducing traction and power driven Sweepers — two models with blower attachments. The ideal machines for cleaning up black top and retread road base before applying the prime coat. Fast, efficient, economical — easy to operate — readily maneuvered in and out of "tight spots" — do a thorough job of removing the fines. Sweepers find dozens of applications cleaning roads, parkways, removing trash from new concrete, etc.

Get the facts on these cost reducing units today — write for Bulletins 110, 111 and 113. Don't wait — write and save!

There are over 400 Hough Sweepers in use today!

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HOUGH *since 1920*

Engine Driven Road Sweeper

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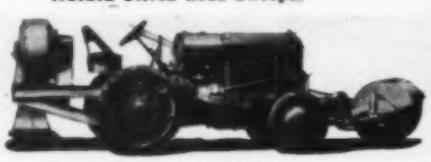
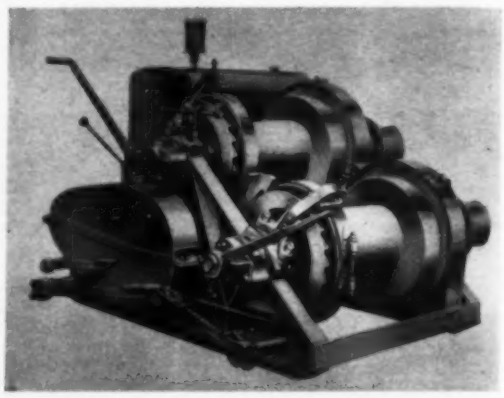


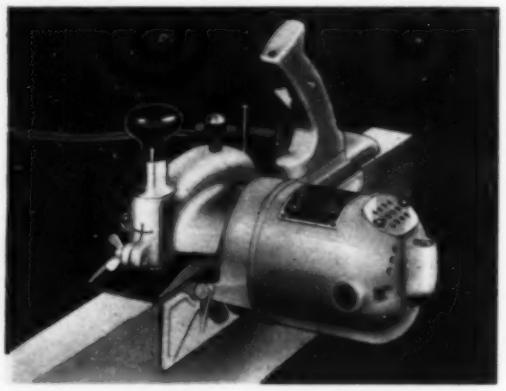
Hough Tractor Sweeper-Blower

ALL-PURPOSE GASOLINE HOIST with three speeds instantly available on both drums obtains variation of speeds and loads through easy-to-operate clutch and gear shift. "Three-in-one" hoist has



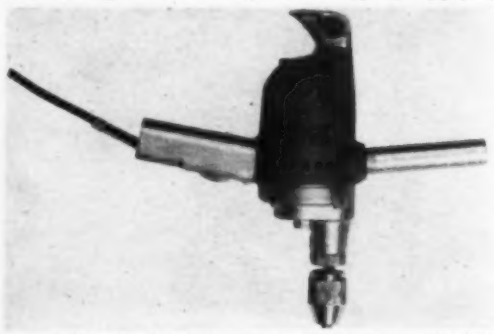
available: for heavy work 7,500 lb. single line pull at 200 f.p.m.; for medium work 4,200 lb. on single line at 350 f.p.m.; for high speed work, 2,500 lb. on single line at 600 f.p.m. Powered by 85-hp. V-8 industrial type gasoline engine. Complete unit built on skid-type, one piece, all-steel frame, including bearings and stands.—**Clyde Iron Works, Duluth, Minn.**

IMPROVED ELECTRIC DOOR PLANE provides accurate method of fitting doors, sash, transoms and of planing any other wood surface 2 7/16 in. in width. Spiral cutter rotating at high speed said



to plane any kind of wood with or across grain and leave finished surface that does not require sanding or scraping. Equipped with convenient two-hand grip, hair-breadth adjustment for cutting 0 to 1/8 in., and improved adjustable type beveling fence. Grinding attachment for sharpening high-speed spiral cutter furnished with each plane. Other features: New power motor and faster and more positive lock on adjusting shoe.—**Mall Tool Co., 7740 S. Chicago Ave., Chicago, Ill.**

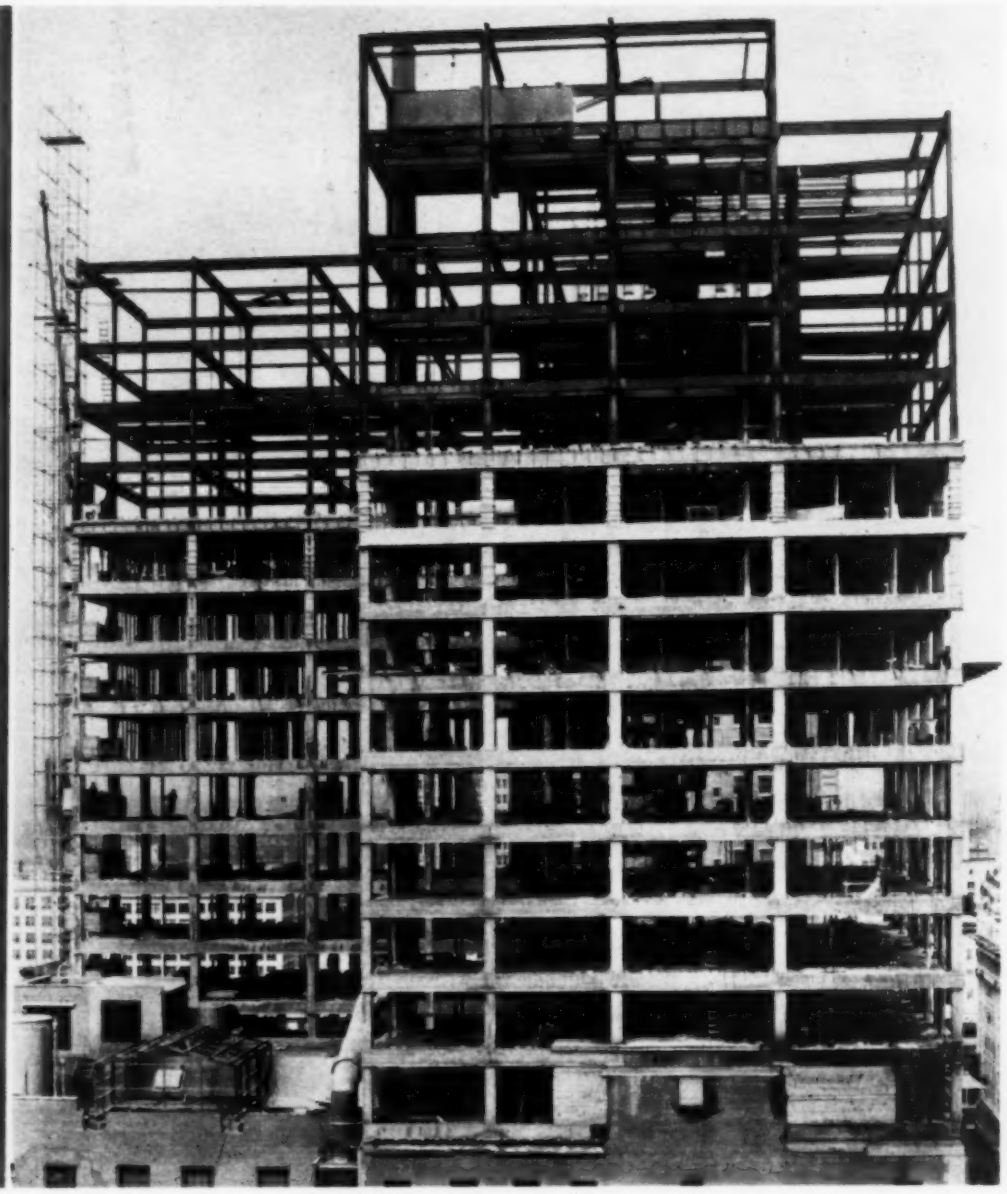
PORTABLE ELECTRIC INDUSTRIAL 1/2-IN. DRILL has combination breast and end handle which is gripped cross-ways instead of in pistol fashion and which, it is claimed, greatly increases naturalness in handling and accuracy in drilling by applying



power directly behind and in direct line with drill point. Other mechanical improvements include: (1) special wound, high torque motor that operates at 500 r.p.m. (spindle speed) and will not stall under 500-lb. thrust while drilling at capacity; (2) greatly improved air cooling assures long motor life; (3) self-aligning, oil-less bearing; (4) removable side handle for close quarters and (5) sliding thumb switch. Has streamlined die-cast case with two-tone finish of blue crackel and lacquered white metal. Weight 9½ lb. — **Speedway Manufacturing Co., 1834 S. 52nd Ave., Cicero, Ill.**

ERECTED THE NOISELESS WAY

with LINCOLN "FLEETWELD" 100%



BUILDING—13-story addition to Chamber of Commerce Building, Houston, Texas. Existing structure was designed originally to take care of extra load.

CONSTRUCTION—1500 tons of steel. Shop riveted. Field welded for noiseless construction. Columns 14-inch x heaviest weight and reinforced. Girders 21-inch x 68-lb. and 18-inch x 47-lb. Floor beams 12-inch x 32 lb.

WELDING—Approximately 8000 feet of welded joints. Lincoln "Fleetweld" Electrodes used 100%.

PERSONNEL—Consulting Engineer and Designer: Robert J. Cummins; Architect: A. C. Finn; Steel Fabricators: The Mosher Steel Company; Steel Erectors: Peterson Bros.; General Contractors: W. S. Bellows.

●

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Through the use of ten connections made of Thermoid Suction Hose, varying in length from 2 feet to 16 feet, the Bridgeton Sand Company of Williamstown Junction, N. J., have made their pipe line completely flexible. This is necessary so that the dredge may be moved to any section of the water . . . and also because of the irregular surface of the ground over which the line runs to the plant. The total length of the line from dredge to plant is 2500 feet, operating under a pumping pressure of 65 pounds per square inch at all times and handling an average of 1000 gallons of sand and water per minute.

Both the Thermoid Suction and Discharge Hose used on this job have been in service for over a year and a half, and in its present condition, it is expected to at least double this service before any repairs will be needed.

If you have a hose requirement that takes "sand" . . . or handles sand . . . you may be sure that Thermoid can supply you with the one hose best suited for the job. Your jobber or Thermoid will be glad to give you specific information on your particular job.

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ARC WELDER. 100-amp. rating at 30 v., for light sheet metal welding and such work requiring low current and fine control, is an a.c., transformer type machine designed especially for use with heavily coated electrodes. Standard wiring is for

single phase 220-v., 60 cycle power supply, with 440-v. supply available, if desired. Open circuit voltage, 65 v. Calibrated scale on front of welder indicates adjustment throughout range of machine which is from 25 to 150 amp. This adjustment made continuously by rotating crank at top with no stopping of operations. Inclosed in sheet metal housing 16½ in. in diameter, 24 in. high. Weight 145 lb.—**Wilson Welder & Metals, Inc., Lincoln Bldg., New York City**

SAW CARTON provides means of handling and dispensing precision metal band saws, eliminating possibility of losing control of coils and giving protection from rust and damage to delicate saw

teeth. Feature of Doall carton is opening in one corner which permits stripping of required saw length from box, keeping remainder intact. Cellophane window enables shopman to determine amount of saw remaining in box. New carton solves problem of storage of saw coils in toolroom. Saw blades 100 ft. long or longer are packed in these cartons which are marked with exact specifications of saws they contain.—**Continental Machines, Inc., 1301-3-5 Washington Ave., S., Minneapolis, Minn.**

STANDARD PRECAST CONCRETE BUILDING UNITS to simplify fireproof construction and lower its cost through mass production will now be made with patented equipment by licensees in designated areas who will be granted exclusive rights to manufacture under company's patents and its trademark, "Cemenstone." System provides for standards of size and quality in precast concrete such as have been developed for steel. Use of vibration, heat and mass production are three main features of Cemenstone methods. Products manufactured are blocks for wall construction; channel-shaped, short-span slabs for floors and roofs, and also long-span slabs; concrete plank; joists; brick; insulating tile and veneering;

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Take a Buckeye Clipper anywhere . . . any time . . . in extreme cold or hot temperatures . . . wet or dry climates . . . high elevations or low . . . expose it to quick temperature changes or use it in long drags . . . its smooth, positive operation is not affected. You can do these extremes with "Mevac" Control because condensation never collects in the control lines.

Figure what this feature alone means to you in increased yardage and on time-limit jobs . . . then add to that the advantages of having non-clogging, self-cleaning crawlers. That's what we mean when we say: "Take a Buckeye Clipper anywhere and it pays its way".

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FULL REVOLVING CONVERTIBLE EXCAVATORS

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The very last word in modern Hoisting Efficiency; develops maximum pulling power per pound of weight. Ultra-modern in design. Welded steel construction gives lightness with strength. Extra drums and slewing attachment can be added in the field.

These Modern Features Insure Maximum Efficiency — Smooth Operation.

1 —All control levers grouped within easy reach from operator's seat. Seat is adjustable up or down.

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3 —Contracting Band Clutches—at opposite end of drum from brake for cool running.

4 —Silent Chain Drive to drive shaft placed between two drums; does away with pinion and 3 to 6 power wasting gears.

5 —Drums rotate in same direction.

6 —Ample waterfall for line clearance.

Available in four models: One to Five Tons Capacity. Gasoline, Diesel or Electric Power.

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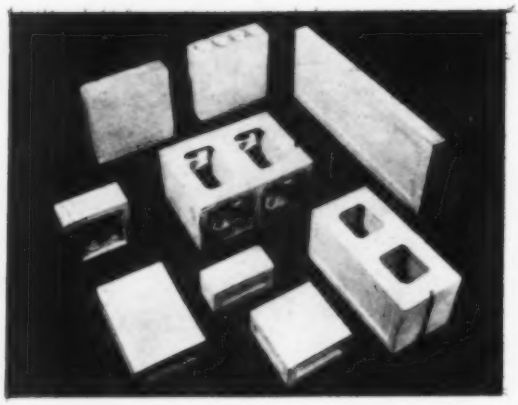
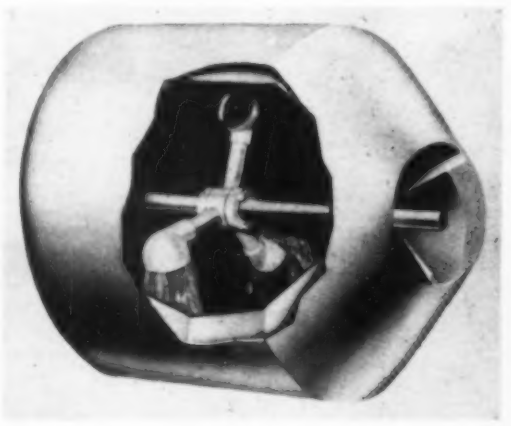


also curbs, sidewalks and fence posts. Equipment consists of rigid steel frame over curing chamber which produces temperature of 160 deg. F. Hopper, riding on top of frame together with vibrators, fills molds with concrete mixed to plastic state. Steam from curing trough keeps molds hot. After concrete has hardened sufficiently, products are lifted out in large groups and unloaded for aging under cover and in constant temperature to prevent unfavorable weather conditions from arresting proper chemical reaction within concrete. — **Cemenstone Corp., Farmer's Bank Bldg., Pittsburgh, Pa.**

IMPROVED WATER IMPELLER for Trukmixers is attached to water line at center of drum. Three outlets are provided, each of which terminates in nozzle that is protected against action of aggregates and sealed against entry of mortar and cement. Impeller provides fast flow and rapid distribution of water uniformly throughout batch. Radial distance between



axis of water pipe and nozzle discharge opening increases pressure head. Discharge openings, at right angles to axes of rotation, create without use of pump, suction due to relative motion between nozzles and concrete. Use of three outlets spaced 120 deg. apart insures greater continuity of water flow, since two outlets are discharging at all times. Complete dismantling of nozzle mechanism for inspection and cleaning made possible by removal of one bolt, adding to speed and convenience of maintenance. In conjunction with automatic water measuring tank with which Trukmixers are equipped, impeller provides complete and efficient water system for Trukmixer use.—**Blaw-Knox Co., Pittsburgh.**

METAL PILE SHOE protects ends of wood pile prevents brooming when driving through shale, gravel or rip-rap and makes it possible to drive piles farther into ground in quicker time. Available in two sizes to fit piles with tip diameters ranging from 5 to 14 in. Made of heavy-gage rolled steel, formed in two sections and electrically welded. Shoes are attached to roughsharpened end of pile through nail holes in each wing. Wings said to be bent easily by hammer to conform to shape of smaller diameter tips. — **Union Metal Mfg. Co., Canton, Ohio.**

IT'S NEW! THE Mall "JACK OF ALL TRADES" GAS ENGINE UNIT

Equipped as a concrete vibrator.

For years you have been waiting for this LOW PRICED, labor saving, profit making tool that has practically no limit to its adaptability. It is an all-around, big capacity tool for CONCRETE VIBRATING, CONCRETE SURFACING, SAWING, SANDING, WIRE BRUSHING and PUMPING; also, for DRILLING in brick, concrete, wood, iron or steel.

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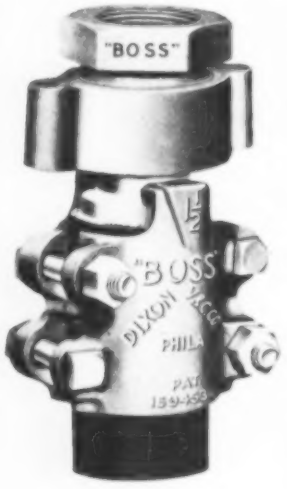

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"G J-BOSS" Ground Joint Type Style X-34

"BOSS" Male, Style MX-16

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All parts are steel or malleable iron, cadmium plated to prevent rust. Made in sizes ¼" to 4", inclusive, with the efficient "BOSS" Offset Clamp on sizes 1" and larger.

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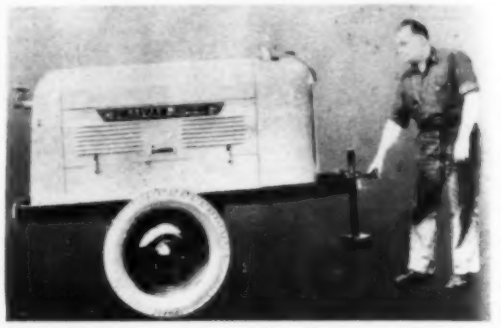
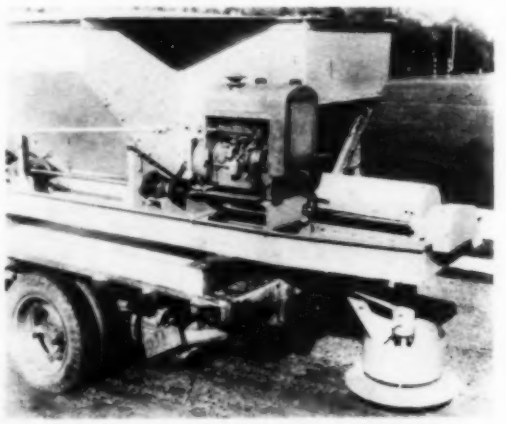


capacities of 60 and 80 cu.ft. per minute. Although compressors have power to operate concrete breakers and rock drills, they are so small and compact that two-wheel mountings can be towed by pleasure car and skid mounted models can be mounted in body of standard pick-up trucks. — **Sullivan Machinery Co., Michigan City, Ind.**

SAND OR AUTO-SKID MIXTURE SPREADER, mounted on truck chassis or in truck body, has 6-yd. bins equipped with barge screw conveyor and spreader of spinner disk type which will operate in a width



of from 9 to 15 ft. One-man control. Powered by Hercules 4-cylinder gasoline power unit 2⅝-in. bore and 3-in. stroke, mounted on spreader frame which drives screw conveyor, permits use of dry or damp sand, and furnishes power for spreader. Independent power allows positive control of spread at any truck speed. Entire unit controlled by truck driver from cab. — **Good Roads Machinery Corp., Kennett Square, Pa.**

SEMI-AUTOMATIC, HIGH-PRODUCTION JACKBIT GRINDER, one-man machine, can grind 60 average hard bits or 100 average annealed bits per hour. Gaging is done automatically while operator is forming face of bit. New machine adaptable for use with all types of standard detachable rock-drill bits

and is particularly suitable for use by mines, quarries and contractors. When grinding to gage, operator places bit on gaging head collet and starts ratchet feed. Bit is then automatically rotated and reciprocated across face of wheel until grinding is completed when it is automatically backed away from wheel. Other features: Anti-friction bearings; inclosed gears; seals to keep bearings and gear housings clean; baffles and splash guards, where necessary, to protect working parts and to safeguard operator. — **Ingersoll-Rand Co., 11 Broadway, New York City.**

AT the end of a hundred-foot bucket line on a gold dredge near the town of John Day, Oregon, there are 10-inch bearings which work constantly under water.

What happens to these bearings is mighty important to the operators of this equipment. In operation the buckets are jammed against the bank of the river under water, biting into sand and gravel, and you can bet that no ordinary lubricant is going to stay put very long under these conditions. And when a bearing goes out, there's a matter of $20 for the bearing and cost of replacement. But a still bigger loss is 30 men idle for four to six hours or maybe longer during the shutdown.

This company was using an expensive graphite grease and still having trouble. When they called in a Shell technical man, he recommended a Shell Grease made primarily for such underwater use. The results were amazing. Even under water and exposed to sand and gravel, it has cut the cash outlays at least 50% and kept down the shutdowns correspondingly. In the last 14 months the dredge has operated an average of 22 hours out of every 24.

This isn't all. Two 280-h.p. Atlas Imperial Diesel engines power the dredge. They have to be made to run almost constantly in temperatures which range from 30° below zero in winter to 105° above in summer. Lubricants in use were unable to cope with the temperature change.

Shell recommended Shell Talpa Oils. And results have proved these lubricants completely satisfactory.

All over the country there is a trained staff of Shell technical men who are anxious to help solve any industrial problems. Let them discuss your lubrication problems with your engineers.

SHELL

SHELL INDUSTRIAL LUBRICANTS

21 CLEVELAND TRACTORS on Pennsylvania's

THE Pennsylvania Harrisburg-Pittsburgh Turnpike is a gigantic undertaking . . . 161 miles over rough, tough country. An average of 300,000 cubic yards of earth, shale and rock per mile must be moved.

It's a *penalty* job. *Time* is at a *premium*. The contractors *must* employ the best equipment-

THE CLEVELAND TRACTOR C

RACS

's Super Highway

powerful, fast, durable tractors. Previous performance records must be *shattered.* A lot of earth has to be moved—*fast!* . . . that means *Cletrac.* Four contractors are now using 21 Cletracs (nineteen F D's and two D D's) on this project.

Because Cletracs are at work on this job these contractors are moving dirt *ahead* of schedule.

Loads of crumbly shale spill over the sides of scrapers, even though the shale is not scarified. Here's a scraper just going into action.

Five of the 21 Cletrac tractors on one section of the road with big loads on every trip.

R CO. **Cleveland, Ohio**

General Motors ushers in A NEW DAY for DIESELS on CONSTRUCTION JOBS

Simpler even than gasoline engines to operate and service, dogged as steam engines in their ability to "hang on"—GM Diesel Packaged Power units bring you Diesel economies without the usual "ifs," "ands," and "buts."

YOU know the Diesel's common advantages—its economy, its lack of fire hazard and how it stops fuel pilferage.

But that's only the beginning of the GM Diesel's story. Equally important are its *operating* advantages over gasoline engines, steam engines—and, yes, other Diesels too!

It's a simpler Diesel, for one thing.

Built on the General Motors 2-cycle principle, it fits in about the same space as gasoline engines of comparable power—may be installed in any of your present gasoline-powered equipment with a minimum change-over. And because every down-stroke in a GM Diesel is a power-stroke—not just every other down-stroke as in 4-cycle engines—there is materially less piston travel and wear.

What's more, it comes in completely engineered *Packaged Power* units of from 15 to 90 hp. (continuous rating)

GENERAL

—fully equipped for either portable or stationary use, all set to go.

No "experts" are needed to operate the GM Diesel—nor to keep it on the job. No special fuels or lube oils are required in its diet. It performs smoothly, quietly on almost any commercially available fuel oil and without the usual heavy smoke exhaust.

Two new General Motors developments are responsible for that: a Unit Injector and Fuel Pump that ends the need for long, high-pressure fuel lines and improved Uniflow *Blower* Scavenging, which—in one sweep—thoroughly cleans out the burnt gases and refills each cylinder with fresh air.

Here the fuel is evenly atomized for more complete combustion. While at *each* period of injection, there's positive timing control.

In practice—on shovels, cranes, draglines, bulldozers and dump trucks —it answers the demands of variable loads with an alertness and flexibility that even gasoline engines can't match, "holds on" with the tenacity of a steam engine.

And in all construction service—with compressors, pumps, ditchers and crushers, too—it can be counted on to provide consistent savings, undiluted by those extra service expenses you may have considered Diesel "musts."

For the GM Diesel is purposely built for continuously dependable service in isolated spots as well as those convenient to sources of service and supply—to behave as well for unskilled operators as for the engineers who designed it.

It is mass-produced, with standardized, readily replaceable parts that are interchangeable cylinder for cylinder and engine for engine. Thus the life of the GM Diesel is literally endless, its maintenance reduced to the utmost simplicity.

And now a nationwide dealer organization is ready to demonstrate what GM Diesel Packaged Power can do for you—is doing for others—in making tough jobs easier and all jobs more profitable. Write for name and address of nearest GM Diesel dealer.

DIESEL ENGINE DIVISION

GENERAL MOTORS SALES CORPORATION

Cleveland, Ohio

MOTORS DIESEL

GM
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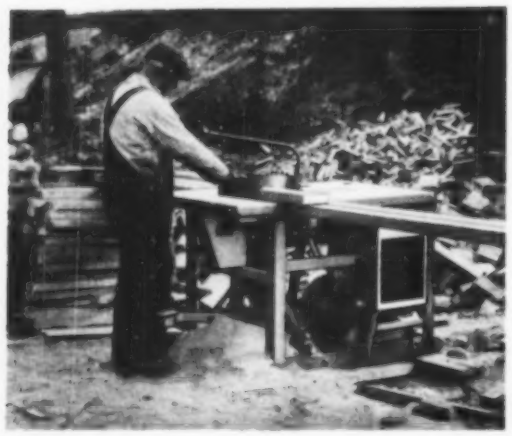

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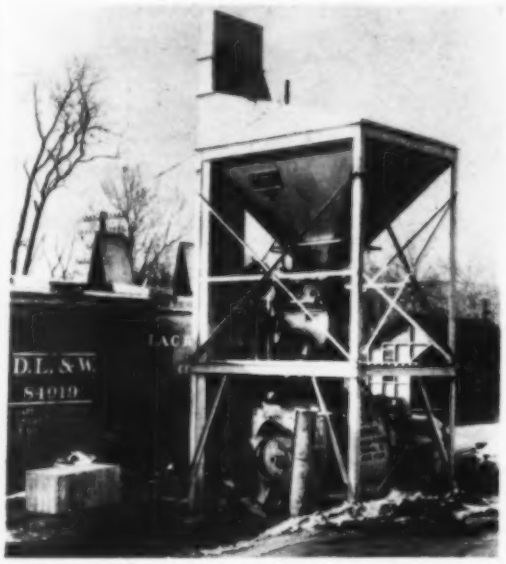
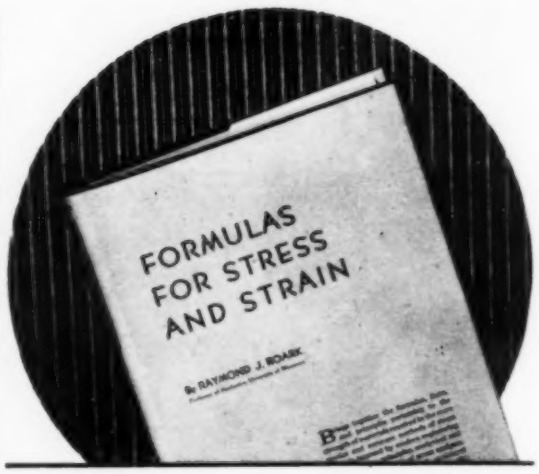
PORTABLE BULK CEMENT PLANT, self-contained unit built in factory and shipped as one unit completely assembled making it unnecessary for contractor to do anything more than disengage chain drive and disconnect screw conveyor when moving



machine. One-piece columns with no hinged sections to weaken structure. Model E-1 equipped with 16-cu.ft. batcher for 1½-yd. batches. When operations require 2- or 3-yd. mixes, 20- and 30-cu.ft. batchers are available. Bolted and gasketed construction permits addition of extensions to storage bins. Gasketed, airtight canvas shroud between rubber tubular valve housing and batcher insures dustless operation. Powered by Hercules gasoline 4-cylinder engine mounted on heavy structural steel base which eliminates need for independent engine foundation.—**Heltzel Steel Form & Iron Co., Warren, Ohio.**

PRESSURE-FEED TYPE SPRAY GUN for light-duty residence, store, hotel and public building maintenance painting, operates on low pressure and with air compressor outfits as low as ¼ hp. Sprays both thin and heavy materials. Available with or without bleeder valve. Useful also for refinishing furniture, store, office and home equipment. — **The De Vilbiss Co., Toledo, Ohio.**

IMPROVED MOLDED ASBESTOS BRAKE BLOCK is said to aid in carrying away frictional heat whereas ordinary molded or woven asbestos friction materials tend to insulate or hold heat. Also claimed to retain uniformly great holding power at all operating temperatures with positive pickup and smooth release under all conditions. Other features: Resistance to wear and freedom from tendency to score, reducing



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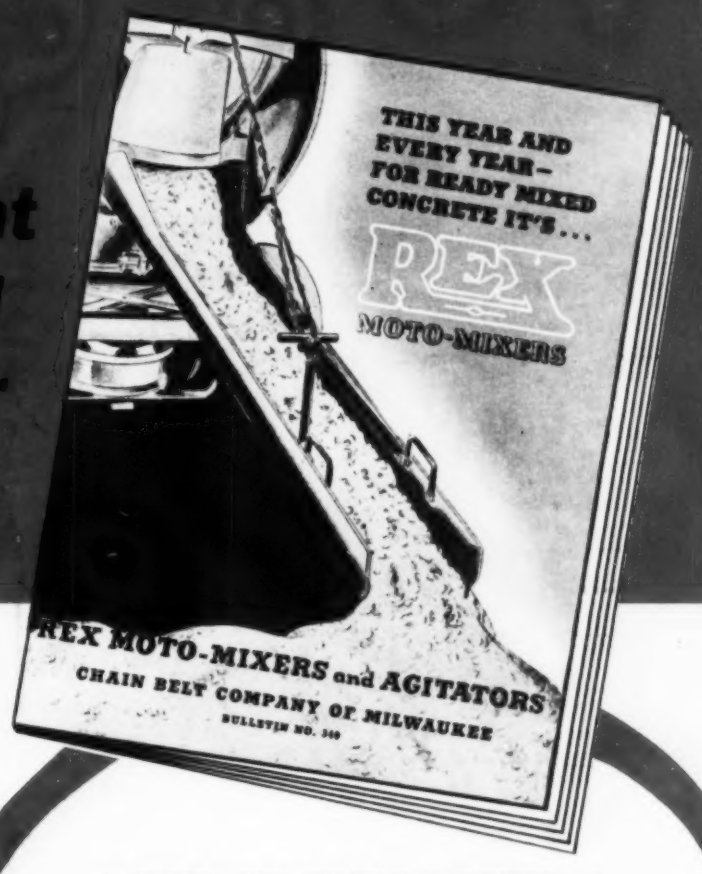
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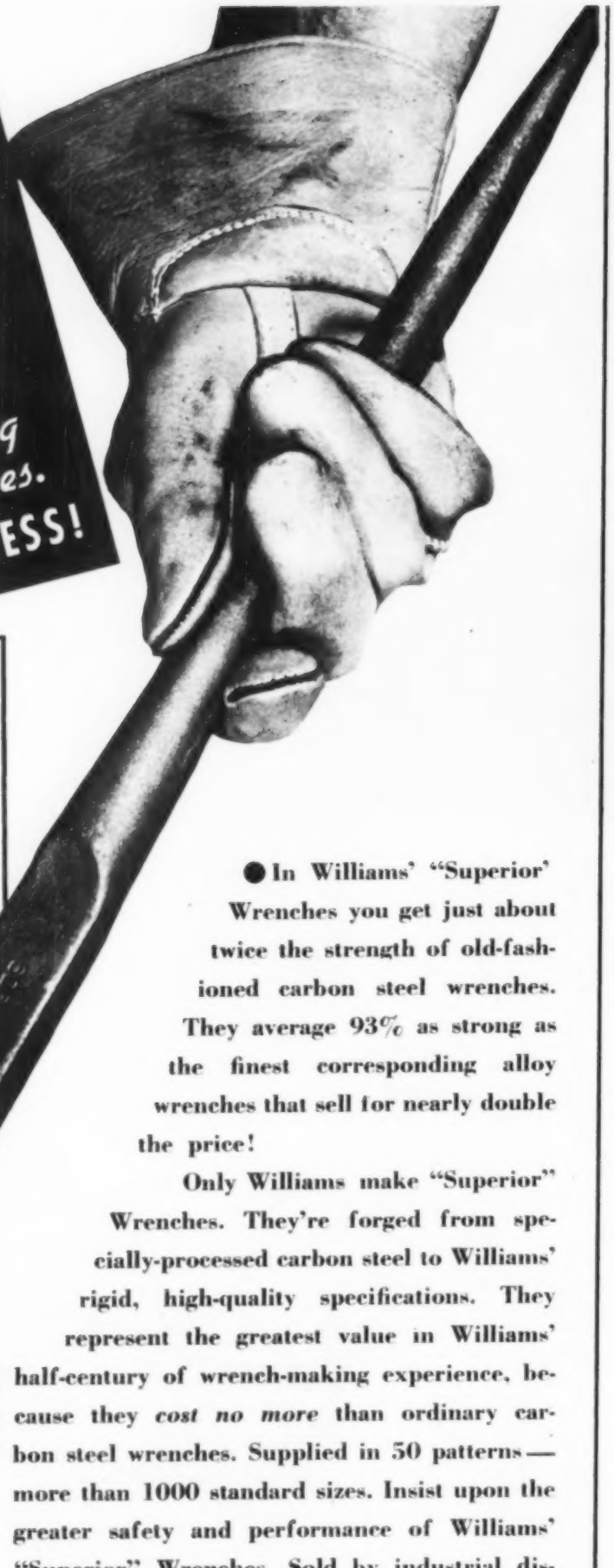

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● In Williams' "Superior" Wrenches you get just about twice the strength of old-fashioned carbon steel wrenches. They average 93% as strong as the finest corresponding alloy wrenches that sell for nearly double the price!

Only Williams make "Superior" Wrenches. They're forged from specially-processed carbon steel to Williams' rigid, high-quality specifications. They represent the greatest value in Williams' half-century of wrench-making experience, because they *cost no more* than ordinary carbon steel wrenches. Supplied in 50 patterns — more than 1000 standard sizes. Insist upon the greater safety and performance of Williams' "Superior" Wrenches. Sold by industrial distributors everywhere.

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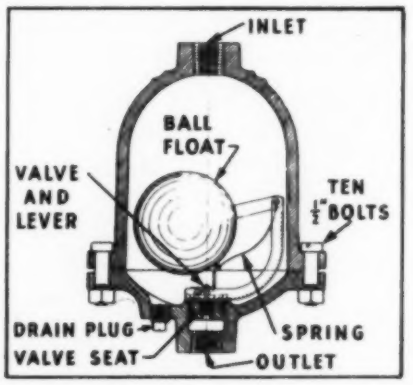
maintenance costs. Available in accurate sizes and shapes for easy installation on brakes and clutches of hoists, steam shovels and other construction equipment. — **Gatke Corp., 228 N. La Salle St. Chicago, Ill.**

ALL-PURPOSE WOODWORKING TOOL, in ½-, 1 and 1½-hp. ratings, is portable unit with suspended motor and arbor that can be adjusted to almost any working position to accommodate wide variety

of saws, grooving heads, shaping cutters, routing and boring bits, grinding wheels and sanding attachments. Adjustable guard, with anti-kickback device, insures maximum safety. Arm incloses roller carriage and carriage-ways. Designed especially for building contractors. Weight, 215 lb. Back guide is reversible for ripping wide panels. Rip, bevel and miter scales are located in plain view and are free from accumulations of dust. Motors operate on either a.c. or d.c. current at 115 v. — **De Walt Products Corp., Lancaster, Pa.**

AUTOMATIC "SNAP ACTION" MECHANICAL TRAP for draining water from compressed air lines, tanks, separators and aftercoolers. Advantages claimed: Immunity to ordinary dirt troubles, ability to discharge water without any loss of air, positive open-



ing and closing of discharge valve and freedom from need for priming. As shown in diagram, trap has ball float connected to short valve lever through flat strip of stainless spring steel. In closed position spring is bowed downward. As water enters body of trap, ball float rises — bending and storing up energy in spring. Just before ball float reaches top of trap spring bends past dead-center and stored up energy snaps valve wide open. In this position spring is bowed upward. As water level drops in trap body, cycle is reversed and valve snaps shut. Quick, forceful closing prevents pieces of dirt from lodging in valve, causing leakage. Capacity, 1,400 lb. of water per hour at 125-lb. pressure and 1,000 lb. per hour at 250-lb. pressure. — **Armstrong Machine Works, 845 Maple St., Three Rivers, Mich.**

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Macwhyte wire rope, famous for its long life and low cost, is better today than ever before!

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Macwhyte steels are better today . . . laboratory tests are more exact . . . workmen are more skilled and experienced . . . field tests are constantly proving and improving the right rope for the specific job.

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AT LOWER COST

And you get it at lower cost, too. For example, the famous special Macwhyte internal lubrication protects Macwhyte ropes from corrosion, makes them easy to handle, cuts down internal friction . . . which naturally increases service life . . . lowers cost.

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In addition, the special PREformed construction allows the rope to run smoothly, easily over sheaves and drums . . . with a minimum of wear on the machine and the rope.

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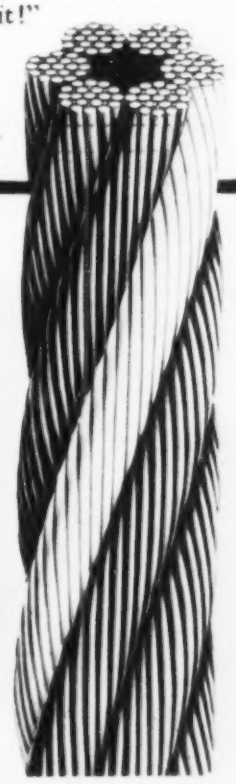

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Invest in the "Years Ahead"—

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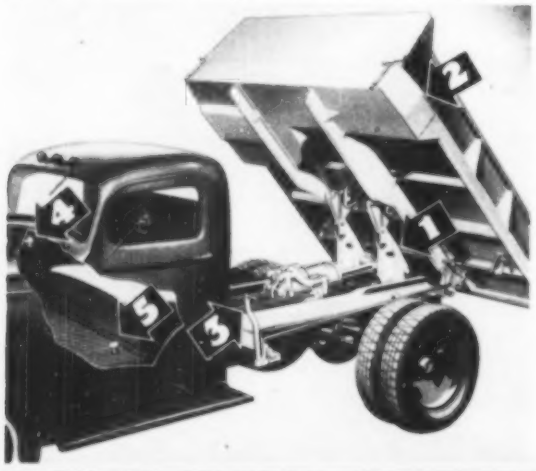

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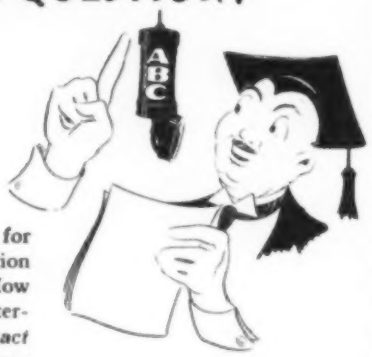

Here's one for you construction men . . . "How can you determine the *exact* loads on lines and cables under service in the field?"

And the answer is, of course, "Use a Martin-Decker Tension Indicator"—the instrument that tells you, *without paper calculations and without dead-ending*, the *actual load in pounds* as it falls on the line! Just clamp it on the dial . . . it catches those strong, steady pulls, or those sudden impact loads that do so much damage but are hard to calculate. With this information at hand, *you'll get greater safety, higher efficiency and longer life from your lines!*

Three sizes accommodate all lines 3/16" to 1¼" diameter, and are fully adjustable for temperature changes. Write for details.

MARTIN DECKER CORP.
LONG BEACH CALIFORNIA

DIESEL MOTOR TRUCK LINE includes six 4-wheel models ranging from 3 to 7½ tons in capacity, with gross vehicle weight ratings from 17,200 to 38,000 lb. Body, cab and payload allowances on various four-wheel models range from 9,300 to 23,400 lb.

Also included are five 6-wheel trucks ranging in capacity from 2½ to 15 tons with gross vehicle weights of 24,000 to 62,000 lb. Powered by Cummins 4- and 6-cylinder power plants, engines of which have 4⅞-in. bore aand 6-in. stroke. Four-cylinder trucks have 448-cu.in. piston displacement and the six-cylinder, 672 cu.in. Air brakes standard equipment on 6-cylinder models and available on smaller size.—**International Harvester Co. Inc., 606 S. Michigan Ave., Chicago, Ill.**

FOR PREVENTING RUST AND CORROSION, new line of non-drying coatings called "Rust-Ban" are said to be economical, durable and impermeable and to be free from hardening or cracking, peeling or slipping from metal surface. They may be removed with petroleum solvents. Various grades of Rust-Ban include: (1) Semi-hard drying coating for indoor and outdoor protection of all surfaces exposed to corrosive conditions; (2) fluid coating for strip steel, precision and machine parts, and small castings exposed to humid or acidic atmospheres; (3) non-drying fluid of heavier consistency for similar applications as in (2) but giving better resistance to high humidity and not to acid fumes; (4) semi-fluid, non-drying type which resists high humidity, salt sproy, acid fumes, rain and sunlight. Other types come under classifications of hard-drying, transparent coatings, hard-drying aluminum coatings and miscellaneous coatings.—**Standard Oil Co. of New Jersey, Rockefeller Center, New York City.**

PORTABLE AIR COMPRESSOR, said by makers to be especially suitable for running compressed air equipment right up to spot where air is required, consists of Model B Allis-Chalmers tractor and Model WW80 water-cooled Quincy compressor. Piston dis-

placement of compressor, 80 cu.ft. per minute maximum. Free air delivery, approximately 58 cu.ft. per minute at 80 lb. per square inch discharge pressure. Power for operation of compressor is provided by sturdy 4-cylinder tractor engine. Horsepower rating of tractor engine is 16.31 with belt and 13.54 drawbar with engine at 1,400 r.p.m. Tractor equipped with rear power take-off and clutch-type pulley for compressor operation. Outstanding feature is detachable mounting which permits compressor to be removed if tractor is needed for other uses. Air receiver tank, mounted on right-hand side of tractor, is built for working pressure of 150 lb. and is tested for pressure of 225 lb. per square inch. Convenient platform and rack for hammer, air hose and other tools are provided.—**Quincy Compressor Co., Quincy Ill.**

Basically Different Lubricating Oil has STRONGER NATURAL FILM

LION Naturalube

MOTOR OIL AND DIESEL ENGINE OIL

Experienced operators testify that internal combustion engines deliver more power at less cost when lubricated with **Lion Naturalube.** Unlike oils of other types, Naturalube does not form troublesome carbon deposits, but, because of its natural solvent power, **Naturalube** actually removes hard carbon deposits thereby restoring power and reducing fuel consumption.

Another money-saving feature is **Naturalube's** stronger natural film which prevents excessive friction-wear. In comparative laboratory wear tests 33 1/3% to 116% more wear occurred when using other type oils than when using **Naturalube. Naturalube's** stronger film provides a full measure of protection even under extreme operating conditions.

Naturalube will help to make every load "paydirt" by lowering fuel consumption, preventing excessive wear, and stopping costly lay-ups for carbon removal jobs. Switch to Lion Naturalube and cut operating costs.

For visible and understandable proof of **Naturalube's** money-saving properties and details of money-back guarantee, phone the nearest Lion Naturalube Dealer or write Lion Oil Refining Company, El Dorado, Arkansas.

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EL DORADO, ARKANSAS

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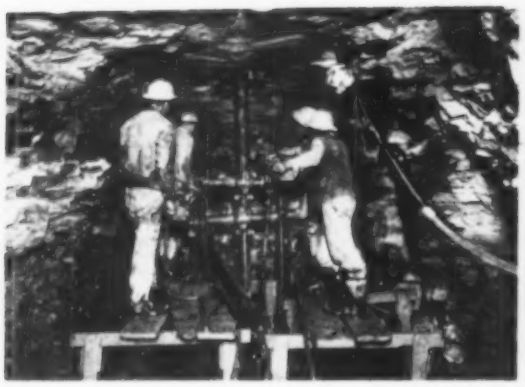
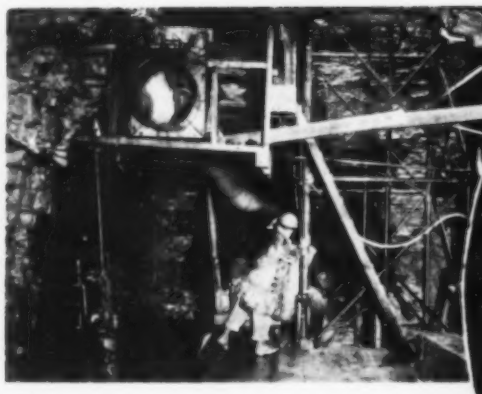
Rochester Test Shows FULL BLOWER CAPACITY Delivered through "VENTUBE"

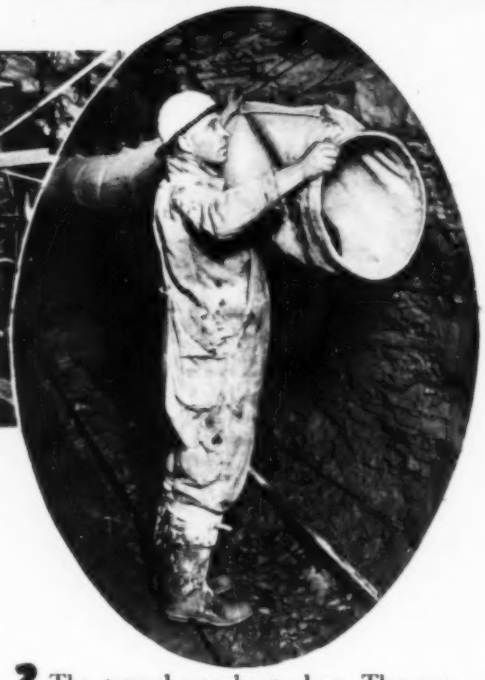


1 One hundred and ninety-seven men drilling and blasting 6,880 feet of tunnel through solid limestone and shale can use up a lot of fresh air. Here's how the men in charge on this St. Paul Street Tunnel in Rochester handled this job, taking special precautions to eliminate rock dust.



2 They drilled headings both ways from the bottom of the shafts with automatic drifter drills. To keep from kicking up extra dust, they drilled wet—and they got smoke and dust as thick as pea soup fog.

Down each shaft they ran an air tube hooked to a 5,000-cubic-foot blower. Ran "Ventube"* out in both directions. (Illustration above shows first section of "Ventube" removed—and the opening shut off with damper). When 400 feet of tubing was in each heading—they checked the air discharge and discovered they were actually delivering 96% of rated blower capacity to the face through "Ventube." The other 4% represents pressure drop.



3 The tunnel was kept clear. The men got back on the job in a hurry—work speeded ahead! To protect the tubing from flying rocks while blasting, the sections nearest the headings simply were slid back on suspension wire. And whenever the tubing was taken down, it was easy to lift the hooks off the wire, roll up the tubing and carry it to a safe place. After the blast, one man could re-hang the tubing in a few minutes.

4 No wonder "Ventube" reduces air loss to a minimum. It hangs straight as a string—gives air a free easy sweep through the tubings. And sections are securely joined by air-tight detachable couplings to prevent leakage.

5 Even around corners flexible "Ventube" ventilating duct stays puffed out to allow free passage of air to the most remote faces or headings.

6 What makes "Ventube" ventilating duct so tough? Why is it used on so many big jobs? (1) Because it's made of extra-heavy, long-fibered Hessian cloth. (2) Because it's both coated and impregnated with resistant rubber that won't peel off. (3) Because when punctured by rocks or equipment, it can be patched as easily as an inner tube. (4) Because it's the cheapest way to ventilate a tunnel yet discovered. Ask du Pont to give you an estimate for ventilating your next job.

DU PONT VENTUBE

THE FLEXIBLE VENTILATING DUCT

E. I. DU PONT DE NEMOURS & CO., INC.
"FABRIKOID" DIVISION
FAIRFIELD, CONNECTICUT

* "Ventube" is du Pont's reg. trade mark for its flexible rubberized ventilating duct.

Tops Them All ON DRAW BAR PULL

ANY MODEL in the extensive valve-in-head General Motors Truck line—is pounds above any comparable truck on draw bar pull! Performance records prove it. GMC SUPER-DUTY engines with POWER-PAK pistons lead in *gas savings!* Actual tests prove greater savings than are possible with any comparable truck. And reports from owners show average gas savings 15% to 40% over the next best records. Get the most power—get the most savings—get a GMC!

CHECK GMC PRICES AGAINST THE LOWEST!

Our own YMAC Time Payment Plan assures you of lowest available rates

GMC TRUCKS TRAILERS - DIESELS

EASIER TO "WEAR IN"...

HARDER TO WEAR OUT...

J-M BRAKE LININGS *and* CLUTCH FACINGS

TO PREVENT COSTLY SHUTDOWNS in the field, operators of this 14-yard shovel use J-M Brake Linings and Clutch Facings on their equipment.

In heavy construction work, you can't afford to waste time giving linings and facings long breaking-in periods. Operations have got to be sure and dependable right from the start. And that's why most leading manufacturers of draglines, shovels, cranes, etc., equip new machinery at the factory with Johns-Manville Industrial Friction Materials.

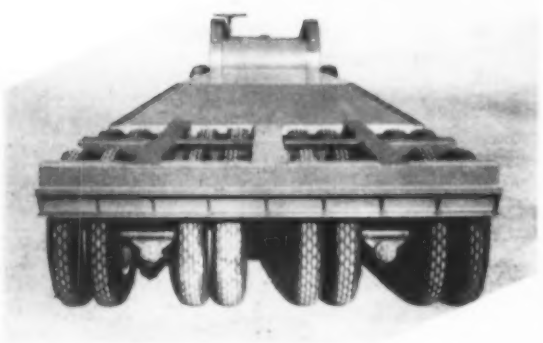
These tough materials give positive brake and clutch control . . . need only the shortest "wearing-in" time. They are exceptionally durable, mechanically strong, highly resistant to heat and shock. Drum scoring is negligible. J-M Brake Linings and Clutch Facings last longer in any heavy-duty service . . . save power . . . keep replacements few and far between.

• • •

Your own equipment will prove the dependability and economy of J-M Brake Linings and Clutch Facings. For full details, write for brochure FM-7A. Johns-Manville, 22 East 40th Street, New York, N. Y.

JM Johns-Manville INDUSTRIAL FRICTION MATERIALS

there's ASSURANCE and SATISFACTION in knowing it's a ROGERS HEAVY DUTY Powered Trailer



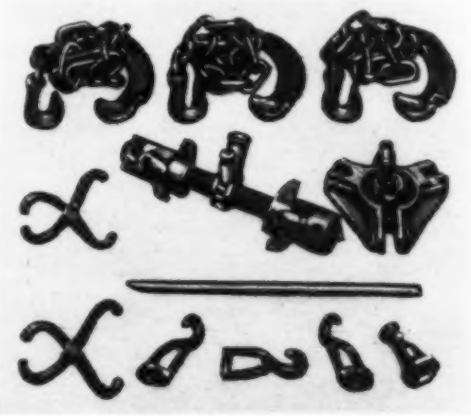
THE building of serviceable trailers to perform satisfactorily under loads of great tonnage requires engineering knowledge that can be gained only by long and close contact with the peculiar problems involved.

The name ROGERS on your trailer will assure getting the utmost in experience, performance and value, based on over 25 years of specialization.

ROGERS BROTHERS CORPORATION
220 Orchard Street
ALBION, PENNA.

EXPERIENCE — built it — PERFORMANCE — sold it

MULTIPLE TOOL called "Util-a-Tool," consists of number of pieces of equipment used in combinations to perform various construction and maintenance jobs, such as spreading and pulling together struc-



tural members or other movable objects within 10-ton capacity; pushing; hoisting; lifting; lowering; clamping; bracing, and tensioning. Tool also removes gears, wheels, pulleys and marine propellers. Five sizes available at present time. Comes in compact metal carrying case with instructions and suggestions for its use. — **Templeton, Kenly & Co., 1020 S. Central Ave., Chicago, Ill.**

RUBBER FOOTWEAR for industrial use in two models: one a heavy-duty work rubber in either all white or black with white with white "Top-Sider" sole,

other an all-white strap bootee fitting snugly just below calf and constructed to provide both warmth and full protection against water and dampness. Both styles feature suction-squeegee sole said to assure complete non-skid contact on dangerously slippery floor surfaces. — **Sperry Shoe Co., New Haven, Conn.**

FOR HIGHWAY CONSTRUCTION AND MAINTENANCE TRUCK equipped with underbody blade not only answers purpose of general use, but also is ideally suited for snow removal, either with one-way or V-type plow. Machine has 154-in. wheelbase,

chassis weight of 6,800 lb. with cab included, gross rating of 16,000 lb., and may be equipped either with 8- or 10-ft. body. Powered with six-cylinder 91-hp. engine having total piston displacement of 381 cu.in. with bore and stroke of 4⅛x4¾ in. and torque rating of 270 ft./lb. Drive is from single plate clutch 14 in. in diameter through heavy-duty truck-type, five-speed selective sliding gear transmission of unit power plant construction. Speed, standard gear, 33 m.p.h.; low gear, 4 m.p.h. Tires are 7.50x20-in. with singles on front wheels and duals on rear. — **Four Wheel Drive Auto Co., Clintonville, Wis.**

ADNUN *Flexibility*

TRADE MARK REGISTERED

MADE THIS JOB POSSIBLE!

—A FOUR foot strip of cold mix down the center of a snow white flint stone surface! The edges had to be sharp and no black material could show anywhere on the snow white material. Because of its perfect hydraulic control, the Adnun Power Cut-off and Adnun Continuous Course Correction, Duval Construction Co., of Jacksonville, Fla. selected the Adnun Black Top Paver.

The job was at Chiefland, Fla. and material was shipped in cars. On arrival it was so dry and lumpy that the machine had to be equipped with extra length teeth on the breaker bar. In spite of the unusual accuracy required and the stiffness of the material the Adnun did a perfect job unfolding behind it a smooth black strip on the clean white pavement. No other standard Bituminous Paver could have equalled this performance. You too, can do a better job at lower cost with an Adnun—that's why there are more Adnuns in service than any other make.

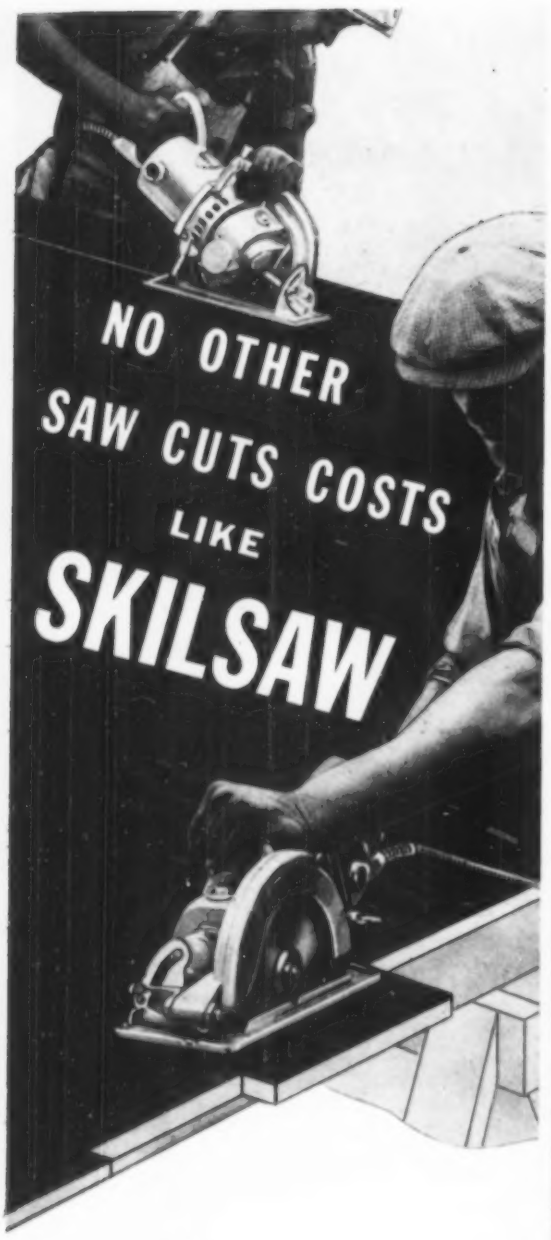
No other Bituminous Paver gives you this combination of advantages

- Breaker bar that gives you pug mill action reducing waste of materials
- Hydraulic controls for better pavement
- Continuous Course Correction for smoother pavements
- Power Cut-off—no tag-end run outs
- Overlapping cutter bar action—tight joints under pressure
- Sturdy construction that stands up in service
- Capacity to over 1000 tons a day

THE FOOTE CO., INC.
NUNDA, NEW YORK

ADNUN
BLACK TOP PAVER

MULTIFOOTE CONCRETE PAVERS AND ADNUN SPREADERS



NO other saw can give you the power and speed of a Modern SKILSAW . . . because no other saw has the background of 19 years of constant improvement that has made the original electric handsaw THE BEST on the market today! SKILSAW out-performs all others on any kind of sawing job — it saws faster and deeper . . . it saves time and labor costs on every cut you need!

Modern SKILSAW is *more for your money* and will *make more for you* . . . on the first job and on all the jobs for years to come!

9 Powerful Models for Wood, Metal, Stone and Compositions

SKILSAW, INC.
5045 Elston Ave., Chicago

- 36 E. 22nd St., New York
- 1429 Spring Garden, Philadelphia
- 918 Union St., New Orleans
- 2065 Webster St., Oakland
- 52 Brookline Ave., Boston
- 2124 Main St., Dallas
- 1253 South Flower St., Los Angeles
- In Canada: 85 Dolcraino Ave., Toronto

Sold by leading distributors of mine, mill, hardware and contractors' supplies.

NEWS FROM MANUFACTURERS *About Their Products*

The publications reviewed below, will keep you posted on latest developments in construction equipment and materials available for your use.

CONSTRUCTION EQUIPMENT — **Construction Machinery Co.,** Waterloo, Ia. (38 pp., illustrated.) Covers latest developments and improvements in company's line of concrete and mortar mixers, bituminous mixers, pumps, hoists, concrete carts, wheelbarrows, power saw rigs and hoppers. As compared with models built by the company 30 years ago, present-day 3½S Wonder tilting mixers are lighter in weight, more perfectly balanced, more portable (Timken bearings and pneumatic-tired wheels), have end discharge for quick wheelbarrow loading, one-piece welded steel frame, and are powered by fully housed air-cooled engines; sizes 3½S to 10S. Also big job mixers in 14S and 28S sizes. For cold patch paving work the bituminous mixer has a power tilt for easier operation. Centrifugal pumps have dual priming feature; sizes 1½ to 10 in. Hoists are available in single and double-drum models. Wheelbarrows have pneumatic-tired or steel wheels.

• • •

ELEVATING GRADERS — **J. D. Adams Co.,** Indianapolis, Ind. (18 pp., illustrated.) Among design features emphasized are strong, all-welded frame, light weight, direct-draft plow beam, regulation of speed of belt, power controls and spacious operating platform. Two models available, Nos. 11 and 12, with 48 and 42-in. carriers. Power unit on No. 11 may be either gasoline or diesel type. Automotive type front axle; no fifth wheel. Positive shaft and gear drive for carrier. Plow beam connects directly to front axle; downward pull exerted on plow gives it great penetrating power.

• • •

PORTABLE AIR COMPRESSORS — **Davey Compressor Co.,** Kent, Ohio. (56 pp., illustrated.) Complete line of portable air-cooled compressors. Two-stage machines in capacities from 105 to 315 cu.ft. per minute. Variety of mountings includes skid, motor truck, wheel and trailer. Tabulated dimensions and weights for all models, which are available with gasoline or diesel engine power. Electric power for stationary machines. Single-stage compressors come in capacities of 105, 160 and 210 cu.ft. of free air per minute. "Auto-Air" units are designed for installation on trucks; there are also tractor-mounted units.

• • •

AIR COMPRESSORS — **Ingersoll-Rand Co., Phillipsburg,** N. J. (28 pp., illustrated.) Line of ES compressors, built in sizes from 10 to 125 hp., and pressures from 5 to 2,500 lb., are of double-acting, horizontal, crosshead type, designed to run at moderate speeds on heavy continuous service. They are available for a variety of drives, including V-belt, short belt, direct-connected electric and steam. Special non-lubricated cylinders are available for the production of oil-free air or gas.

• • •

SMALL HOMES MANUAL — **National Lumber Manufacturers Association,** 1337 Connecticut Ave., Washington, D. C. (32 pp., illustrated.) Booklet entitled "The Best Way to Achieve Low-Cost Housing is to Build Low-Cost Homes" illustrates and describes each of twelve low-cost homes presented as demonstration patterns this year by the National Small Homes Demonstration, as well as the home now being erected at the New York World's Fair in the "Town of Tomorrow." The latter is a slight variation of one of the one-story basic demonstration homes. The National Small Homes Demonstration is an incorporation of thirty-two leading building material dealers cooperating in a joint effort to provide more small homes within reach of the lowest income class and to encourage a greater concentration of effort within the building industry on this type of structure. An article on the cost of building a home under the F.H.A. insured mortgage plan for 15-, 20- and 25-year periods is presented in tabulated form. Histories of the successful 1936-37 and 1938 National Small Homes Demonstration programs, and a story on "How to Get the Best in Your Wood Wall" are included.

• • •

SHIELD-ARC JUNIOR WELDER — **Lincoln Electric Co.,** Cleveland, Ohio. (4-p. folder, illustrated.) Portable machine designed for a large number of welding applications within range of a 150-amp. unit. Will weld practically all metals and alloys and do hard-facing work. It is of the motor-generator d.c. arc type, with self-indicating dual continuous control, permitting independent adjustment of voltage and current.

• • •

CONCRETE MASONRY FOR BETTER BUILDINGS — **Portland Cement Association,** 33 West Grand Ave., Chicago, Ill. (24 pp., illustrated.) This new illustrated book presents the architectural and structural advantages of concrete masonry for exterior and bearing walls, fire-safe partitions, economical backup, and as an interior wall treatment for decorative, acoustic and insulation purposes. Photographs of stores and factories, theaters and recreational buildings, churches and schools, apartments and housing projects in all parts of the country illustrate the adaptability of concrete masonry to a wide variety of building types and requirements.

• • •

ELECTRIC ARC WELDING—**The Hobart Brothers Co.,** Hobart Square, Troy, Ohio (4-pp. folder, illustrated). Savings in labor, material and overhead through use of new 40-volt arc welder. Folder stresses 30 days' trial at manufacturer's risk.

• • •

EYE PROTECTION IN WELDING — **Lincoln Electric Co.,** Cleveland, Ohio. (4-p. folder, illustrated.) Discusses types of radiant energy in industrial operations that affect the eye, including ultra-violet, visible and infra-red rays. Advice on selection of proper lenses in shields and goggles to protect eyes of welding operators.

• • •

PNEUMATIC TIRE CARTS—**Red Star Products, Inc.,** 12910 Taft Ave., Cleveland, Ohio. (4-p. folder, illustrated.) Improved features of two-wheel dump carts for concrete or other materials include pneumatic tires, disk wheels, sealed hubs with Timken bearings and watertight heavy-gage sheet steel hoppers, lap welded. Three models in capacities of 6 to 11 cu.ft.

• • •

HEAD AND EYE PROTECTION — **Chicago Eye Shield Co.,** 2300 Warren Boulevard, Chicago, Ill. (48 pp., illustrated.) Line of specialized equipment for protection of heads and eyes of workers includes goggles, spectacles, hoods, masks, shields and respirators. Hardened, non-shattering Cesco lenses resist severe impacts. Chippers' goggles are ventilated by air channels beneath lenses to prevent fogging. Filter glass for harmful light rays. Welders goggles are ventilated while shields of seamless construction provide maximum comfort and complete facial protection. Respirators, for injurious dust conditions, permit easy breathing and normal conversation. Sandblast mask has aluminum dome and suspended apron with connection for compressed air.

• • •

TRUCK MIXERS — **Chain Belt Co.,** Milwaukee, Wis. (40 pp., illustrated.) Mechanical design and operating information on new Rex Moto-Mixer. Detailed illustrated descriptions of major elements of unit, including cone-end mixing drum, drum mounting on ball-bearings and rollers, twin-clutch power transmission with single lever control for multiple range of drum speeds, self-measuring water system, box-type frame, quick operating charging door held by four-way positive clamp, multiple-speed discharge control. Drum capacities for moto-mixers and agitators range from 1½ to 7 cu.yd. Complete specifications and dimension drawings for each size of unit. There is a partial list of moto-mixer users together with a map spotting locations of important jobs handled by them.

TURNS GRAVEL PITS INTO GOLD MINES

● Big in capacity, powerful and efficient . . . Austin-Western Portable Crushing Plants are built to deliver material in volume *at the job*, making local gravel deposits veritable "gold mines" for A-W Crusher owners. The high cost of haulage is eliminated . . . output costs are exceptionally low . . . making possible a higher percentage of successful bids without sacrifice of normal profit.

For example, a Western contractor writes: "Our A-W Portable Crusher produces 95 c. y. of gravel per hour from a gravel bar which has a high dirt content. It has enabled us to handle some pretty low bids and at the same time make satisfactory profits."

Convincing evidence of the extra profits or savings these self-contained, readily-transportable A-W Units make possible is found in the number being used by large operators with hundreds of thousands of dollars invested in fixed plants.

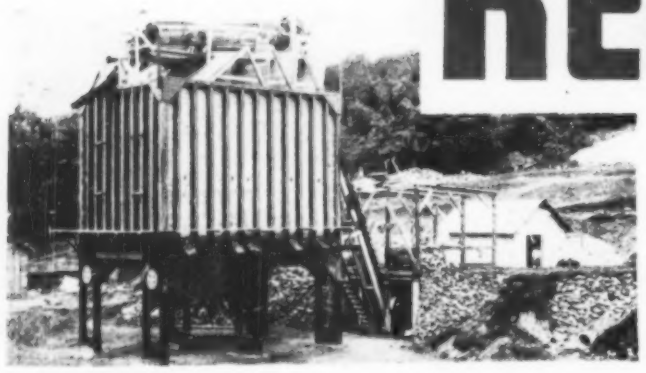
The consistent high output, economical operation and low maintenance cost of A-W Crushers are results of sound engineering and honest construction throughout. Deep jaws, operating at unusually high speeds on oversize shafts and oversize bearings, outperform and outlast all other jaw crushers, size for size, in fixed or portable plants. Screens, conveyors, etc., put out aggregate at top speed. There are no bottle necks to choke production. There is an A-W Portable Crushing and Screening Plant for every need. Write for full details. The Austin-Western Road Machinery Company, Aurora, Illinois.

★ Austin-Western ★

Motor Graders
Roll-A-Planes
Rollers
Snow Plows
Crushing and Screening Plants
Washing Plants
Blade Graders
Motor Sweepers
Shovels and Cranes
Bituminous Distributors
Elevating Graders
5-Yard Tractor-Scraper
6-Yard Tractor-Scraper
8-Yard Tractor-Scraper
12-Yard Hydraulic Scraper

Either way - make it a

Reliance



CRUSHING PLANT

A complete unit—rapidly set up, inexpensive to operate, insuring large capacity, very little vibration. Crushing, elevating, washing, screening done on spot, materials stored in Reliance Steel or Wood Bins (completely fabricated, easy to erect). Experienced contractors put these Reliance Units together quick to meet any job capacity — at a profit. You too, will do well to investigate.

PORTABLE *with* V-BELT DRIVE

Whether you use this Reliance Portable Crusher alone or in combination with an Elevator, Chute Screen, etc., you can get no better value for your money in terms of capacity, low operating cost and rugged durability. The Reliance Crusher is famous for its strength and simplicity. It is particularly stable. A "swell" buy for crushing on any job. Send for detailed circular.

PRODUCTS:

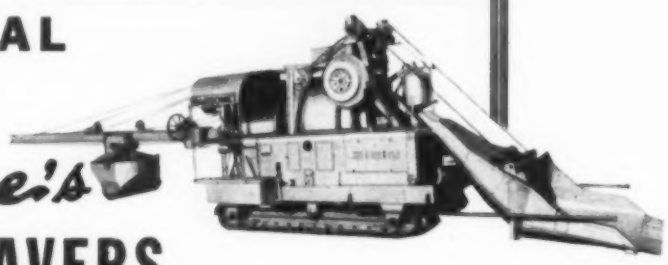
Reliance offers a complete line **of Rock Crushers; Bucket Elevators; Revolving Screens; Storage Bins; Pulverizers; Chip Spreaders; Heating Kettles; Bin Gates; Feeders; Belt Conveyors; Grizzlies; Air Separators; Sand and Gravel Spreaders; Wash Boxes.**

UNIVERSAL ROAD MACHINERY COMPANY

KINGSTON, N. Y., U. S. A.

DISTRIBUTORS in ALL PRINCIPAL CITIES of U. S. A.

THE LOGICAL PAVER IS— *Ransome's* 27-E "DUAL DRUM" PAVERS



With Finger Tip **HYDRAULIC CONTROL & AUTOMATIC FEATURES**

WHY? *Because*—

1. They are making records for economy and quality of concrete all over the country.
2. Every part is more easily controlled with less danger and effort.
3. Requires no change in plant or road equipment (as in larger capacity mixers).
4. The 27-E Single Drum and "Dual Drum" Pavers can be worked on same job in perfect harmony if desired and fed by same batching equipment.

RANSOME CONCRETE MACHINERY CO.
DUNELLEN **NEW JERSEY**

Ransome "DUAL DRUM" *Pavers*

STEEL-PANEL BUILDINGS — **Tennessee Coal, Iron & Railroad Co.**, Birmingham, Ala. (14 pp., illustrated.) U. S. Steel's System of Panelbilt construction for low-cost buildings, developed in cooperation with Farm Security Administration, is designed for field assembly with ordinary labor. Prefabricated panels, in standard widths of 4 ft., of galvanized sheet steel on frames of cold formed strip, primed and coated, are formed by shop welding in precision jigs. Eave heights vary from 6 to 12 ft. Steel floor joists are spaced 4 ft. across building. Doors and window panels are interchangeable with solid panels. Buildings can be dismantled, moved and re-erected. Photos illustrate step-by-step erection of typical structure and two pages of drawings show design details — System is applicable to wide range of styles, types and sizes, including dwellings, store-houses, barns, etc. All field connections are bolted. A supplementary 17-pp. pamphlet contains specifications and architect's plans of a number of dwellings of different types that can be erected by the Panelbilt systems.

• • •

BITUMINOUS PAVING EQUIPMENT—**Littleford Bros.**, 443 East Pearl St., Cincinnati, Ohio. (Six new folders illustrated.) Separate bulletins deal with: Two models of pressure distributor for applying asphalt or tar, one, Model M, designed primarily for maintenance work, and the other, Model C, for heavier new construction of black-top roads; portable, two-wheel heating kettle with hand spray attachment; two-wheel trailer type utility spray tank in capacities from 300 to 1,200 gal.; motorized wheeled roller for patch work; trailer type tool box with 25 compartments.

• • •

WIRE ROPE CORROSION — **Macwhyte Co.**, Kenosha, Wis. (1-p. bulletin, illustrated.) Basic information, condensed to single page, to enable wire rope users to combat corrosion. Covers causes, effects and remedies for corrosion, with suggestions as to proper lubrication of wire rope.

• • •

ALL-WHEEL DRIVE — **Marmon-Herrington Co., Inc.**, Indianapolis, Ind. (10-p. pamphlet, illustrated.) Describes how power and traction of Ford V-8 trucks may be increased by applying drive to all four wheels by installing a driving front axle and a two-speed auxiliary transmission or transfer case in combination with standard four-speed Ford transmission. Conversion produces eight speeds forward and two in reverse. Mechanical specifications are tabulated for various models, including drive on four and on six wheels.

• • •

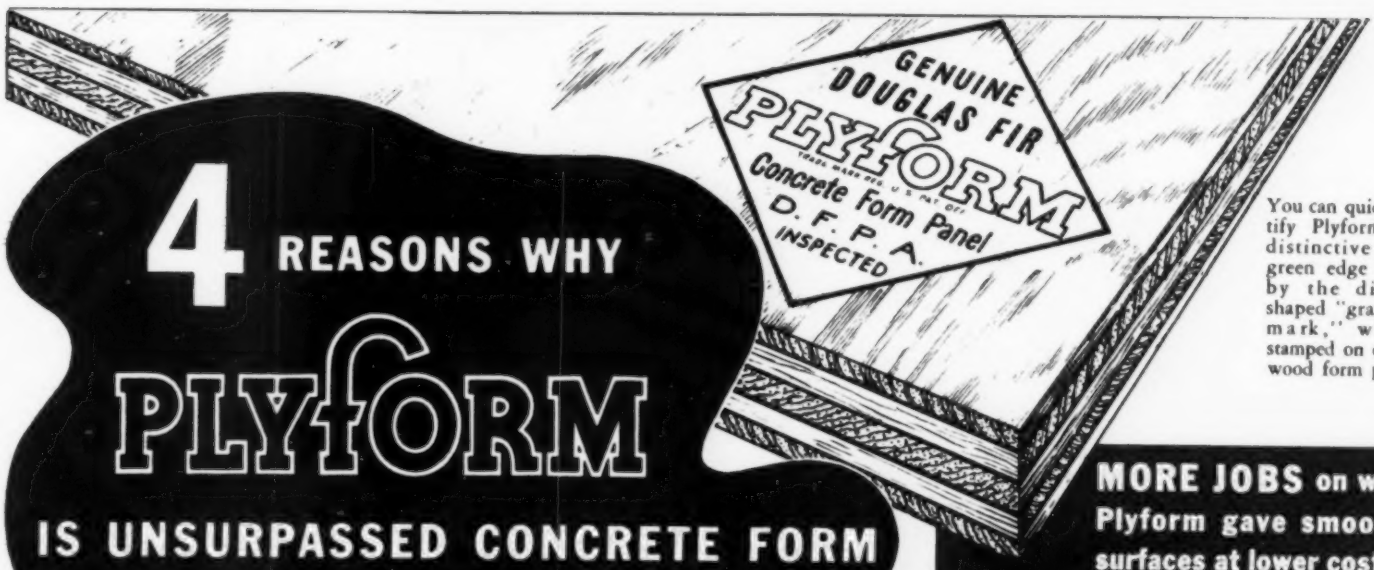
ROAD MACHINERY — **White Manufacturing Co.**, Elkhart, Ind. (16 pp., illustrated.) Machinery for construction and maintenance of roads and streets includes portable asphalt plants, pavement repair trucks, material dryers, concrete vibrators, asphalt and tar heating kettles, power lawn rollers, kerosene torches, concrete mixer heaters and other equipment.

• • •

CORROSION PROOF COATINGS — **American Concrete & Steel Pipe Co.**, Southgate, Calif. (11 pp., illustrated.) Cold-applied, corrosion-proof sprayable plastic coating called Amercoat, for concrete, metal and wood surfaces. Includes information on general characteristics, tests of physical properties and uses of coatings of several types and application instructions.

• • •

DIESEL TRACTOR—**Caterpillar Tractor Co.**, Peoria, Ill. (32 pp., illustrated.) Operating costs and specifications of the 25-hp. Caterpillar diesel D2 tractor, capacities and the place that the D2 tractor will fill in agriculture, logging and industry, are given through actual action pictures and owners' statements. Features of the tractor's engine, transmission and track construction are shown by the use of photographs, and are explained in the concise corresponding text. The booklet is printed in two colors and profusely illustrated.



You can quickly identify Plyform by its distinctive silver-green edge seal and by the diamond-shaped "grade trade-mark," which is stamped on every plywood form panel.

4 REASONS WHY PLYFORM IS UNSURPASSED CONCRETE FORM MATERIAL

1. The satin-smooth surfaces of every Plyform panel are oil-treated at the mill.
2. Plyform panels are edge-sealed in distinctive silver-green and stamped with a diamond-shaped trade-mark for easy identification.
3. Only premium water-resistant glues used!
4. Serves as sheathing and lining combined!

END GUESSWORK . . . save time and money . . . get better results and smoother surfaces with Plyform. These big Douglas Fir Plywood concrete form panels are strong and rigid, yet lightweight and easy to handle. They can save you up to 12c a square foot on rubbing and finishing costs alone. A Plyform panel gives 100% coverage without waste. It strips very easily — can be re-used numerous times, then salvaged for sub-flooring, etc. Get acquainted with money-saving Plyform.

There is a grade of Douglas Fir Plywood for every purpose . . . and every grade is trade-marked!

PLYFORM This is genuine Douglas Fir Plywood concrete form material. Made with special water-resistant glues. Designed to give numerous re-uses and smooth, unblemished surfaces. Serves as sheathing and lining combined.

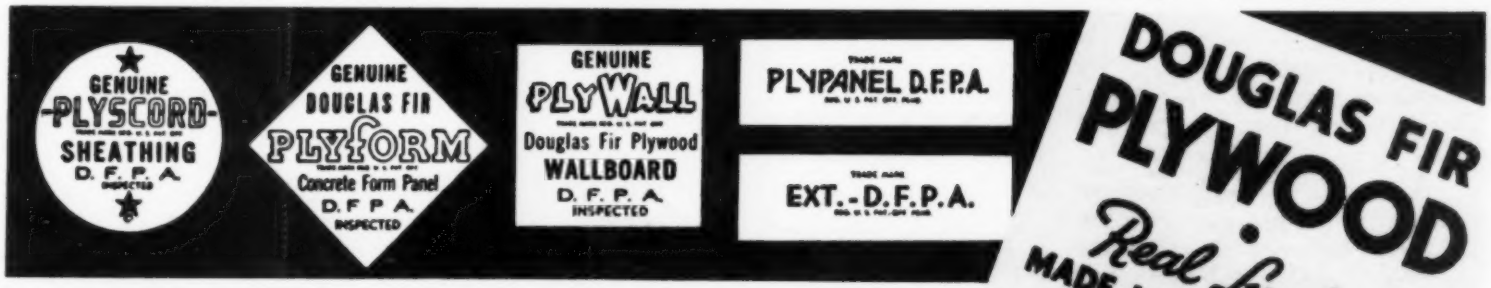
PLYSCORD This utility grade is ideal for wall sheathing and sub-flooring. Excellent for one-use concrete forms.

PLYWALL The wallboard grade. Builds puncture-proof walls and ceilings.

EXT-DFPA In very humid areas or where 50 or more re-uses are desired of a form, build it of this exterior grade of Douglas Fir Plywood. Made with waterproof glues.

PLYPANEL This cabinet grade is perfect for all built-ins and fine paneling.

BE SURE TO SPECIFY BY THESE "GRADE TRADE-MARKS" WHEN YOU ORDER!



FREE DATA ON PLYFORM and other grades of Douglas Fir Plywood.

DOUGLAS FIR PLYWOOD ASSOCIATION, Tacoma Building, Tacoma, Washington. Please send me technical booklet on Plyform [ ]. Check here [ ] if you also wish information on other grades of Douglas Fir Plywood.

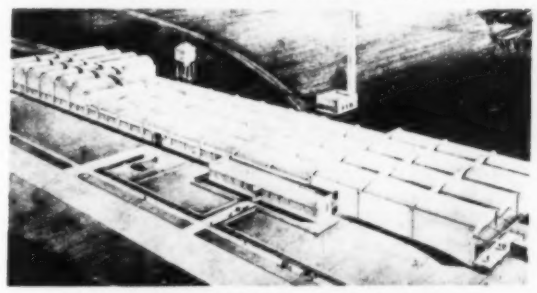
Name_____ Address_____

City_____ State_____

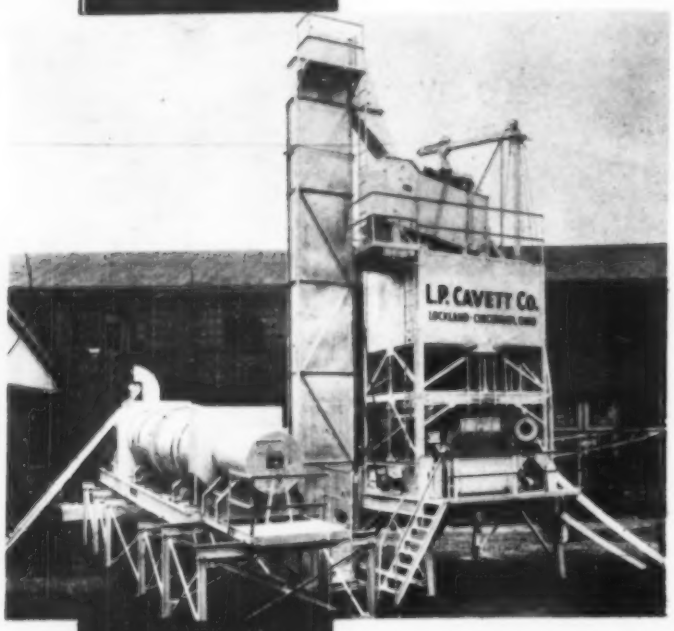
MORE JOBS on which Plyform gave smoother surfaces at lower cost . . .

Yerba Buena Island Tunnel, Oakland Bay Bridge

Erie Railroad grade crossing elimination, Jamestown, N.Y.



Armstrong Tire and Rubber Factory, Natchez, Miss.
Consulting engineers, Roberts & Schaefer Co.



MODEL P-A PLANTS ARE BUILT IN 4 SIZES

MODEL PA-15
1500 = Mixer

MODEL PA-20
2000 = Mixer

MODEL PA-30
3000 = Mixer

MODEL PA-40
4000 = Mixer

A NEW PORTABLE ASPHALT PLANT

in completely assembled sectional units easily moved by truck or rail and quickly erected without the use of a crane or gin pole.

Patents applied for — Built in 4 Sizes

Write for Bulletin T-260

HETHERINGTON & BERNER, INC.

701-745 Kentucky Avenue — Indianapolis, Ind.

Bulk-Cement Loading

(Continued from page 39)

in the proper positions at all times. When empty, the dump is perfectly balanced in the lifted position. Simply a touch of the wheels of the loaded cement cart starts the dump on its way down. As the dump approaches the horizontal position it is picked up by the second balance point which increases the lever arm of the counterweight and thereby retards the movement of the dump. In the horizontal position the dump rests on the third balance point which is so placed as to balance the dump when loaded with a full cement cart. When the cement is dumped, the dump becomes unbalanced and begins to lift, causing the cart to return to the platform without any pull on the part of the operator.

Two of these cement docks were in service last season and the men using them have been extremely well pleased. The economy of these cement docks is apparent because of the repeated use and the ease of erection and transportation. Experience indicates that one of these cement docks can be completely placed, ready to operate in 10 man-hours. These cement docks were designed and built in the company's own shop under the direction of the writer, and I. L. Gebhard, equipment engineer.

HOW TO MAKE CRUSHED STONE AT THE LOWEST COST!

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UNIVERSAL

Cement-Grouted Sub-Ballast Slab

Supports Railway Track Under Heavy Mainline Traffic

(Continued from page 62)

excavation was started. Four crawler gas cranes with ¾-cu. yd. buckets, mounted in gondolas, dug the old ballast and loaded it into empty gondolas between each crane. Total time for excavation was 21 work-train hours spread over parts of 3 days, whereas it was originally scheduled for completion in one day of two 8-hr. shifts. Nominal depth of excavation was 2 ft. below bottom of ties, but no effort was made to cut this grade accurately. The extra gang completed the grading by hand and the bridge and building gang set the 12-in. side forms as the excavation progressed.

Stone for the slab was unloaded from gondolas directly on to the subgrade by gas cranes. This work started late on the third day while excavation was still in progress. All four clamshells worked effectively when handling stone and the 240 cu. yd. of stone required for the slab was in the forms and

(Continued on page 108)

The Truck Trend Proves It . . .

CHEVROLET'S the Chassis

AMERICAN business and industry bought 115,426 trucks in the first quarter of 1939—a gain of 19,769 over the same period of last year. That is a nice increase *for the truck industry—20.7 per cent.*

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STANLEY ELECTRIC TOOLS
"COST LESS PER YEAR"

(Continued from page 106)

leveled off by 5:30 p.m. Thursday, the fourth day. Work-train time required for unloading the stone was 6.5 hr.

The slab stone was standard crushed stone ballast ranging in size from 2½ to 1¾ in. Laborers leveled it to the top of the forms as fast as it was deposited, giving a normal 1-in. crown at the center of track. Two men using a 12x12-in. oak tamper then compacted the stone, making it ready for grouting.

Grouting Methods and Equipment — Grouting started at 7:55 a.m. on Friday, the fifth day of work. It was a warm, clear day and the entire 600 ft. was grouted continuously in 10 hr. of elapsed time.

A mixer train operated on the two near tracks of Bedford Yard. On the first track were two sand cars on either side of a flat car carrying the mixers. With these 5 cars were an air compressor car and two locomotive steam cranes. On the next track two box cars containing cement were coupled to the mixer car so that the entire setup could be moved along by the locomotive cranes as grouting progressed westward from the upgrade end.

Grout was delivered from two 10-S mixers into a 38-cu. ft. tank. At the bottom of this tank was an agitator paddle, operated by an air motor, which kept the grout thoroughly mixed as it ran out by gravity through a valve into 50 ft. of 2½-in. fire-hose and thence to the stone.

The consistency of the grout, as measured by the flow cone, was maintained at 21 sec. throughout. The charge at each mixer to produce the 21-sec. flow was 3 sacks of cement, 600 lb. damp sand, containing 5 per cent surface moisture by weight or 3½ gal. free water, and 21 gal. of added water. The water-cement ratio at the mixer was thus 8.2 gal. per sack of cement. The added water was measured by a ⅝-in. water meter at each mixer. Each batch produced approximately 8 cu. ft. of grout.

Grout was distributed by one man at the nozzle of the hose; two men with warehouse brooms brushed excess grout ahead or into voids where needed. Grouting progressed continuously as each local area was filled, at an average rate of about 1.1 track-ft. per minute.

Evidence of penetration of grout into the stone was observed in craters dug into the stone down to the subgrade ahead of the grouting. The grout ran forward on the subgrade and started filling upward about 4 ft. ahead of the hose.

As grouting proceeded the 12x12-in. oak tamper was used for compacting the grouted stone. No effort, however, was made to produce a finished surface since the roughness due to projecting stones was considered advantageous in retaining top ballast.

The grouting crew comprised 16 laborers and foreman from an extra gang, 7 bridge and building men and foreman, and one compressor operator. Six men (3 at each mixer) shoveled sand and 6 others wheeled sand to the mixer skips. Two men carried cement to the mixers and 2 others dumped cement into the skips. There were 2 mixer operators and 2 men at the water meters. One man was at the discharge, 2 distributed excess grout with brooms, and 2 men tamped the grouted stone.

Because cool weather and rain followed the grouting, other curing was deemed unnecessary. Replacing the track was started on the third day after grouting. Ties were placed directly on the slab and the rails dragged back. Top ballast of the same stone used for the slab was dropped and the

(Continued on page 109)

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(Continued from page 108)

track jacked up on it to give 12 in. of new ballast between the slab and the bottom of ties. The track was then made ready for traffic.

On Monday, Nov. 21, 10 days after the slab was grouted, the new track was cut back into the main line at about 9:30 a.m., and at 12:55 p.m. the first train — a long, heavily loaded ore drag with two powerful I-1 locomotives, one pulling and one pushing — passed over the slab at 10 mi. per hour. Trackmen continued to make minor corrections to line and surface for several days before all speed restrictions were removed.

Grouting Under Traffic — The second part of the project — grouting the slab while traffic was maintained — was started on Nov. 17. The division superintendent arranged to detour one westward passenger train and any westward freights affected around Bedford Yard, leaving a free construction period from 11:08 a.m. to 6:00 p.m. The daily construction schedule for grouting under traffic was a full cycle of operations including track removal, excavation, placing and grouting slab stone, placing top ballast and reassembling track for traffic over a distance of two rail lengths, or up to 78 ft. Three sections of this work — 66, 58 and 78 ft. respectively — were completed before snow forced the work to stop.

Two steam cranes, located on the near track in Bedford Yard, were used for excavating these sections. Here again, due to the nature of the material, digging was so slow that the 7-hr. schedule was slightly overrun the first day. This difficulty was overcome to an extent on the two following sections by dynamiting the top crust of the old ballast.

As soon as excavation permitted men to work, the subgrade was leveled and the side forms set. Two clamshells operating from another yard track dropped slab stone on to the prepared subgrade from a considerable height. This stone was carefully leveled on top, but was not compacted with the tamper as was the eastward slab.

The mixer train and crew were ready for operation as the excavation equipment moved away. Grouting methods were identical with those employed on the eastward slab except that consistency of the grout was slowed to a 23 to 24-sec. flow instead of 21 sec. Although this mix was more sluggish, it was well adapted for the job and will be used in further work.

Immediately after 10 or 12 ft. of stone was grouted, top ballast was dropped on it and leveled off 12 in. above the slab top. By the time grouting of this 58-ft. slab was completed, more than half of the top ballast was in place. In order to study the effect of definitely separating the top ballast from the slab, empty paper cement sacks were placed to cover about half of the freshly grouted surface. The ties were brought back at once, as were the rails, and the track was reassembled as fast as possible and lined and surfaced for immediate use. Although on the first day one train had to be detoured after the 7-hr. construction period had elapsed, the schedule was met easily on the following two sections, which were installed on Nov. 19 and Nov. 22.

Grouting of the third section (78 ft.) on Nov. 22, was followed by 5 days of heavy snow, and it was decided that the remaining 398 ft. of slab to be grouted under traffic should be left until spring for completion. With 600 ft. of slab construction with traffic diverted, and 202 ft. grouted with traffic maintained, it was considered that a sufficient amount of grouted slab was in place for observation of its behavior under heavy traffic in winter.

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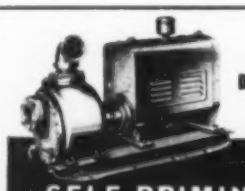
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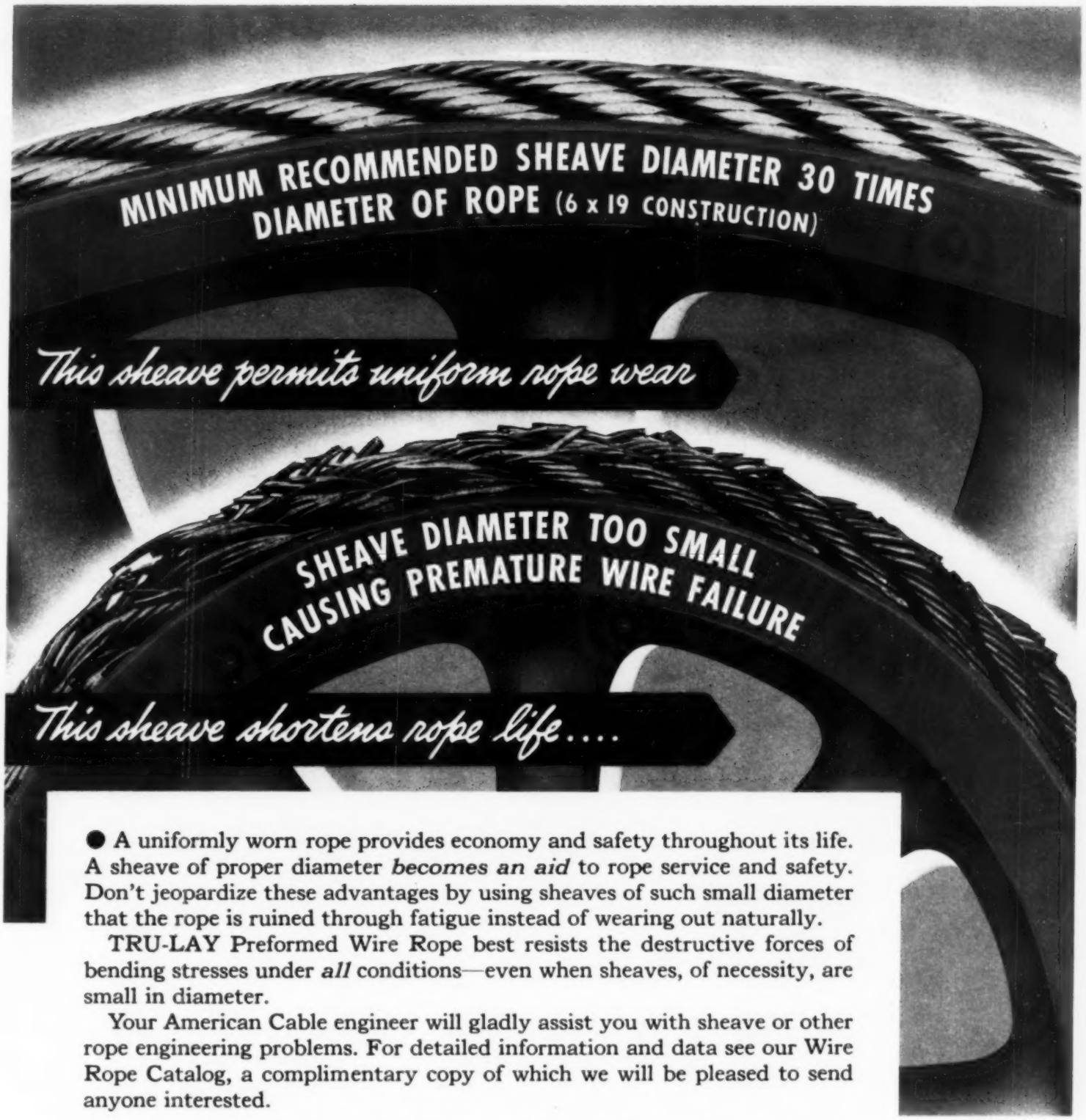
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